PVP

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PRODUCTION

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NEWPORT INDUSTRIES Co.

A Division of Heyden Newport Chemical Corporation
342 Madison Avenue New York 17, New York

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PVP

Announcing

another Shell Chemical service for paint makers...

Epon® Resin in ready-to-use solutions

You save valuable time when you buy Epon resin solutions, because weighing, compounding, filtering, and standardizing are done for you right at the Shell Chemical plant.

Epon resin solutions come to you ready-to-use, with the solvent and solids content standardized. You save on handling time, too, because Epon resin solutions can be pumped with ordinary equipment. These solutions may be integrated into time-tested coating formulations, eliminating the need for costly experimentation in your own laboratories.

If you do not find the Epon resin solutions you need in the table, perhaps we can compound one to your exact requirements after we analyze your problem. Get complete information by phoning or writing your nearest Shell Chemical district office.

EPON RESIN SOLUTION	RESIN	SOLVENT	% SOLIDS
Epon 834-X-90	834	Xylene	90
Epon 836-C-75	836	MIBK	75
Epon 1001-A-80	1001	Acetone	80
Epon 1001-B-80	1001	MEK	80
Epon 1001-BT-70	1001	MEK/Toluene (50/50)	70
Epon 1001-CX-75	1001	MIBK/Xylene (65/35)	75
Epon 1001-T-75	1001	Toluene	75
Epon 1001-X-75	1001	Xylene	75
Epon 1007-CT-55	1007	MIBK/Toluene (50/50)	55

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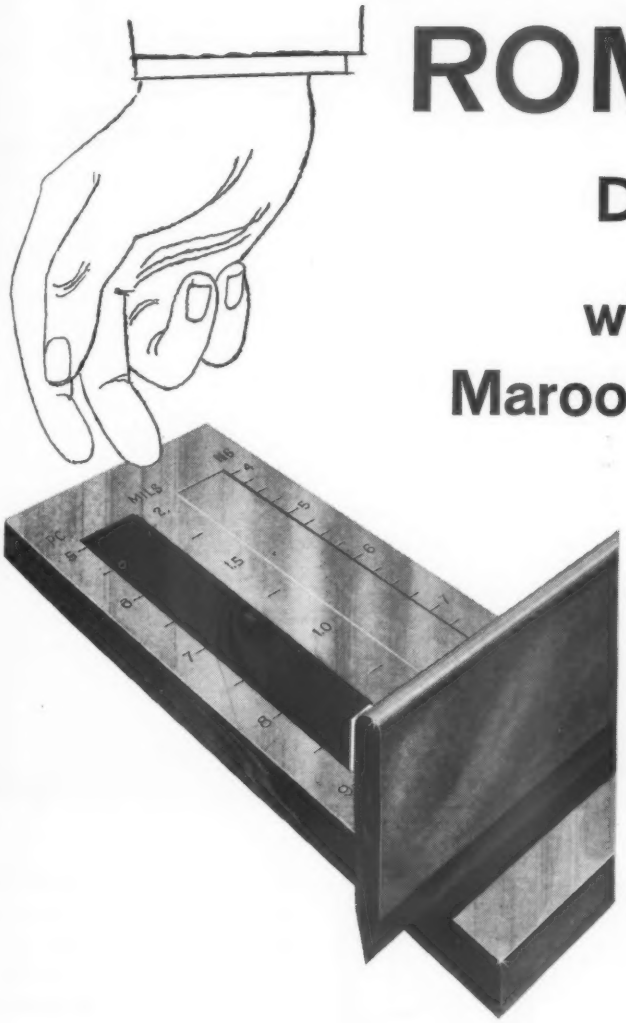

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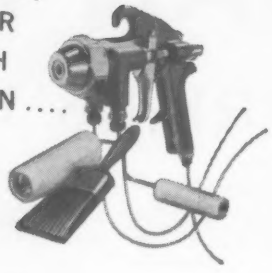

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JULY
1960

Formerly PAINT and VARNISH PRODUCTION MANAGER
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In Our 50th Year

NEXT ISSUE

Our August issue will carry an informative article on the use of 2-Nitropropane Solvent in protective coatings. Such important topics as properties, solvent formulation in vinyl, epoxy, and polyurethane coatings will be covered in detail.

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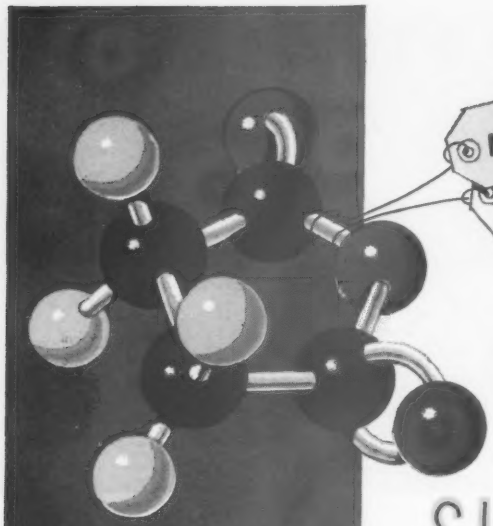

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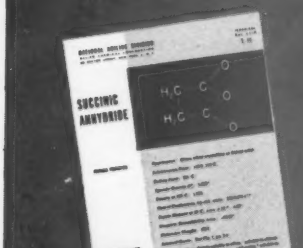

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EDITORIAL COMMENT

Tung Oil Takes on a New Look

TUNG oil has had a long and interesting history in the paint and varnish industry. Its earliest use as a coating material dates back to the ancient days of China where it was used as an ingredient in the famous high-quality furniture lacquers.

In 1936 the United States was importing 150 million pounds of tung oil. Most of this volume was used by the paint and varnish industry, particularly in the manufacture of high quality spar varnishes. However, consumers found many faults with this imported oil. Among them were uncertain shipments, adulteration, erratic quality and wide price fluctuations. But in spite of these faults, consumption of tung oil continued at a high level until the outbreak of World War II. With supplies from China completely blocked, the consumption of tung oil fell to 12 million pounds in 1942. High price and short supplies characterized the tung oil situation during the Korean war. The embargo placed by the United States on all tung oil from Red China virtually ended imports which naturally was followed by a drop in consumption to about 50 million pounds—a figure which is being maintained today.

Back in 1932, the first domestic crop of tung nuts was obtained from groves in Florida. This crop yielded 60,000 pounds of oil. Production continued to rise steadily reaching a volume of 10 million pounds in 1945, 20 million in 1949, 40 million in 1953 and 44.5 million in 1958, a record crop.

In recent years, considerable work has been carried on by both the United States Department of Agriculture and the Pan American Tung Research and Development League in developing new uses of tung oil in the coatings industry. Of particular interest has been some interesting research of the Southern Regional Research Laboratory of the U.S.D.A. in New Orleans on tung oil varnish formulations. This work has resulted in two interesting papers: (1) Preparation of Varnish and Varnish Type Vehicles Containing Tung Oil and (2) A Cost Analysis of Tung Oil—Resin Varnish Vehicles, both of which are being published in this issue. To get an insight of what is happening in the tung oil field we urge you to read and study these two articles.

Are You Convinced?

WHEN delays, breakdowns, dirty, hot and crowded cars and increasing fares are constantly irritating you and you wish you had a job in the suburbs, just think that as a commuter you're considered a very unique individual.

According to a recent item in *The Wall Street Journal*, commuting has much to offer. Here are some gleanings from this item.

"Unlike the urban citizen the commuter is afforded a chance to awaken his senses, to breathe the country air that will invigorate his body and sharpen his mind.

"The train ride, far from being a spine-splintering ordeal, actually provides a respite from life's ceaseless demands. Neither the boss at home nor the boss at the office can disturb the serenity of the coach (except the card games); nothing can be demanded of him during this interlude except his ticket.

"Most riders prefer to sit quietly, dully, contentedly and read their newspaper. This, in fact, is the prime delight of commuter travel—the opportunity to read the whole paper clean through, from the woeful reports on page one to the woeful appraisals of the woeful reports on the editorial page.

"Commuter arrives at work not only more more awake than his city-dwelling colleagues but more enlightened. And, at day's end, commuter can take leave of urban soot and clamor, he can temper his mood if things have gone badly or, if it has been a good day, he can savor the delicious after-taste of success."

The lot of the commuter is not so bad after all, even with the "count down" hanging over his head.

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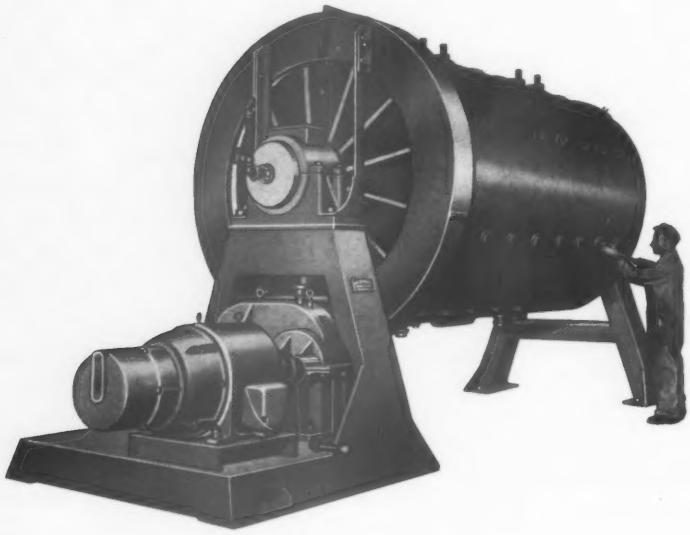

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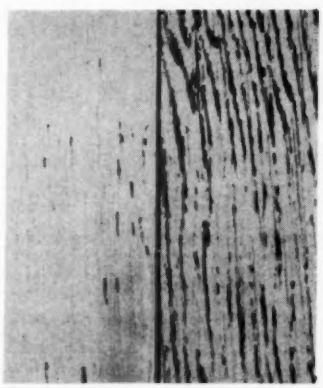

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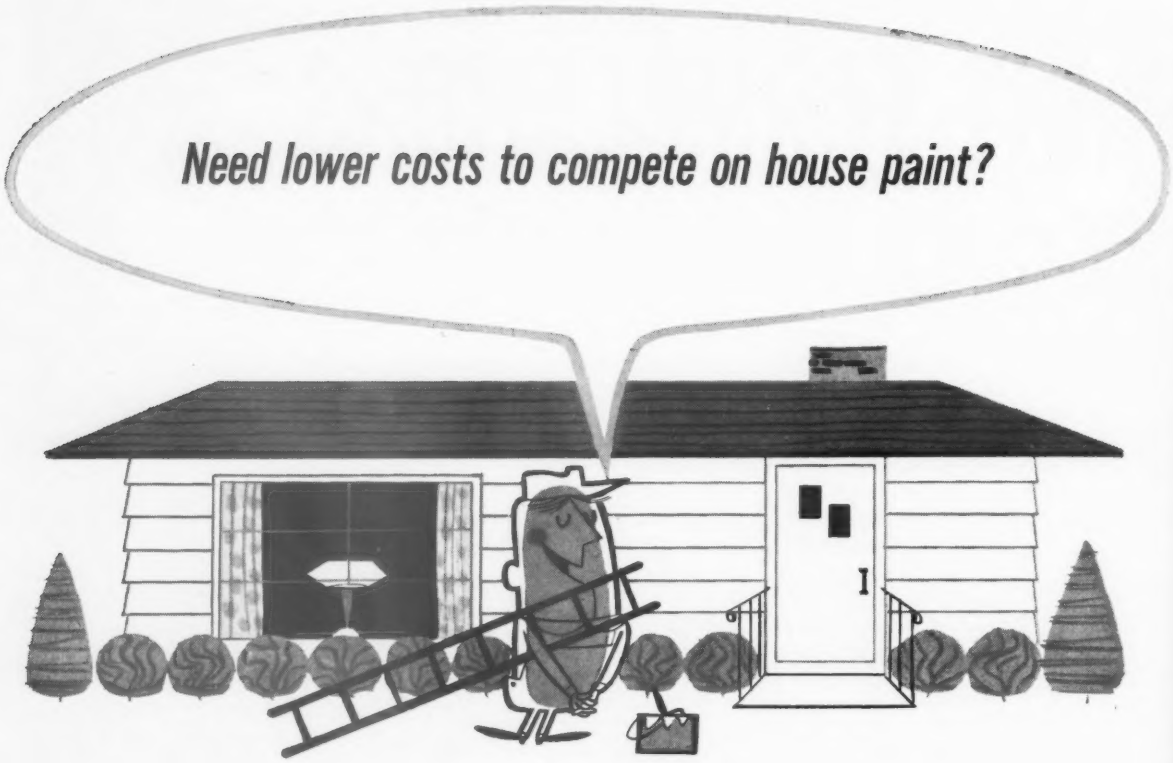

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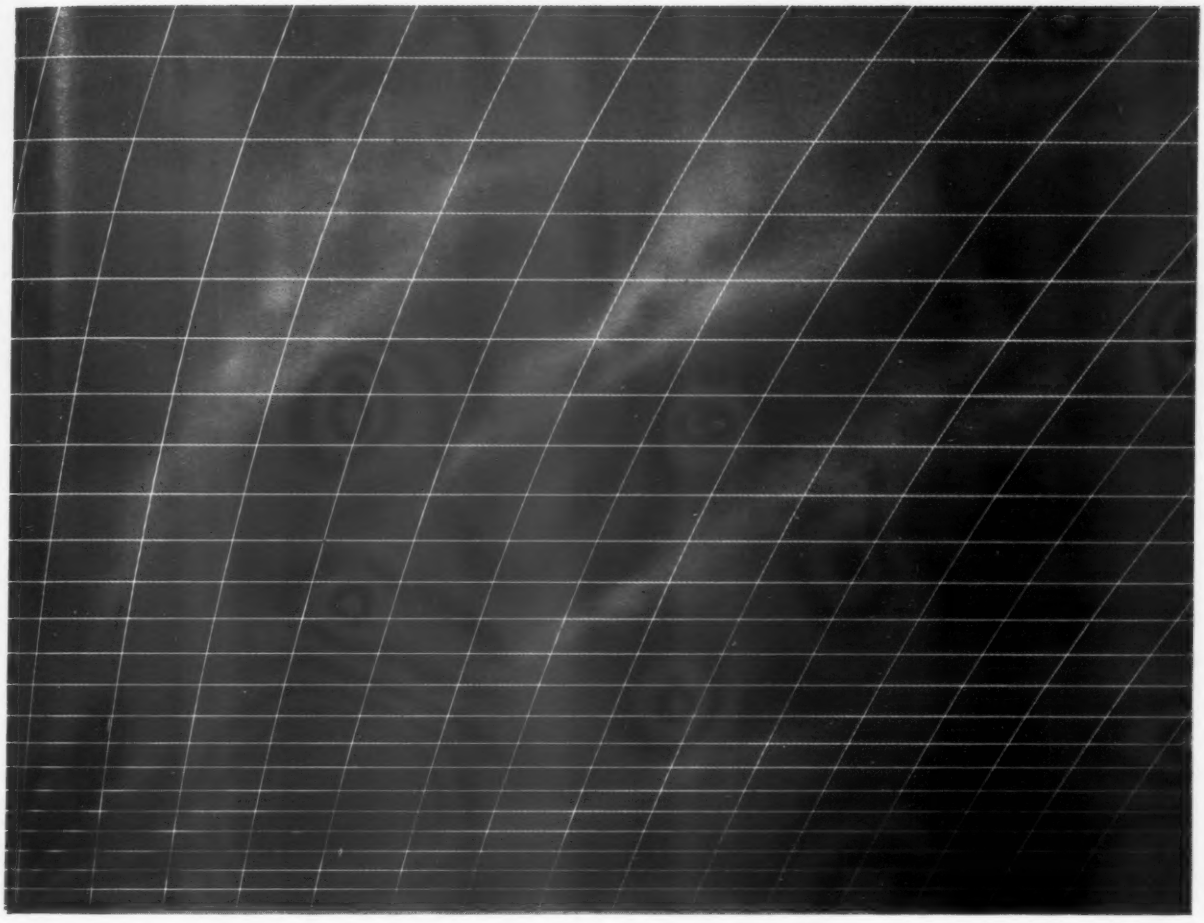

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THOSE SOLVENTS YOU ORDERED LAST TIME WERE CONTAMINATED!
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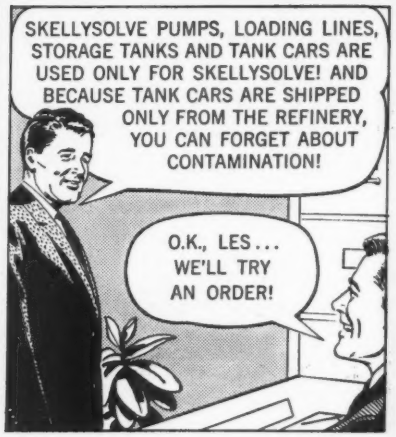
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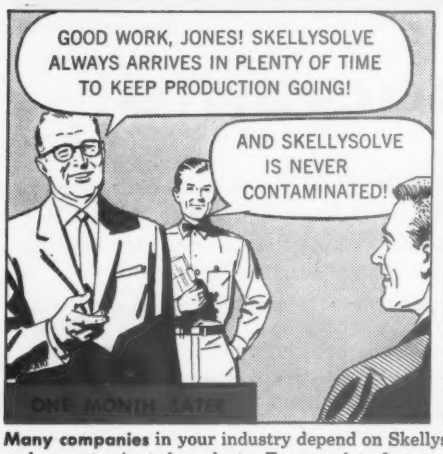
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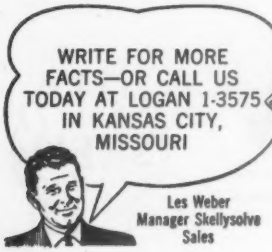

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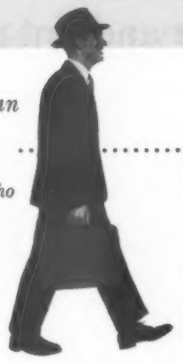

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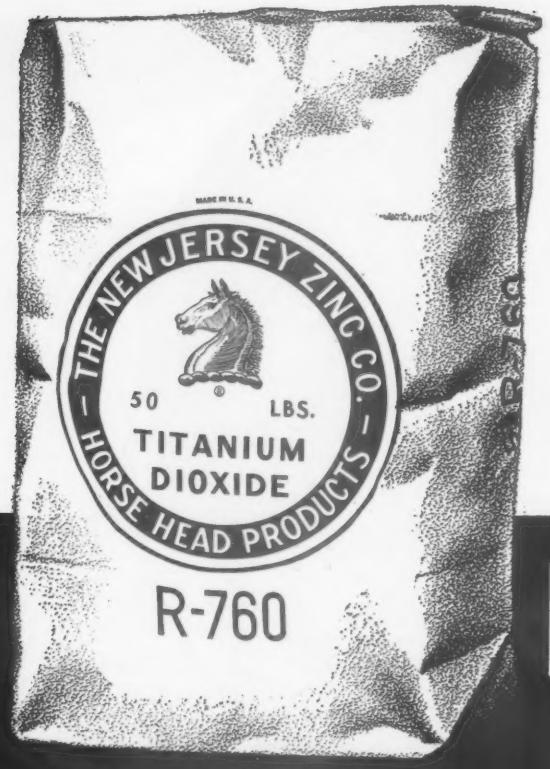

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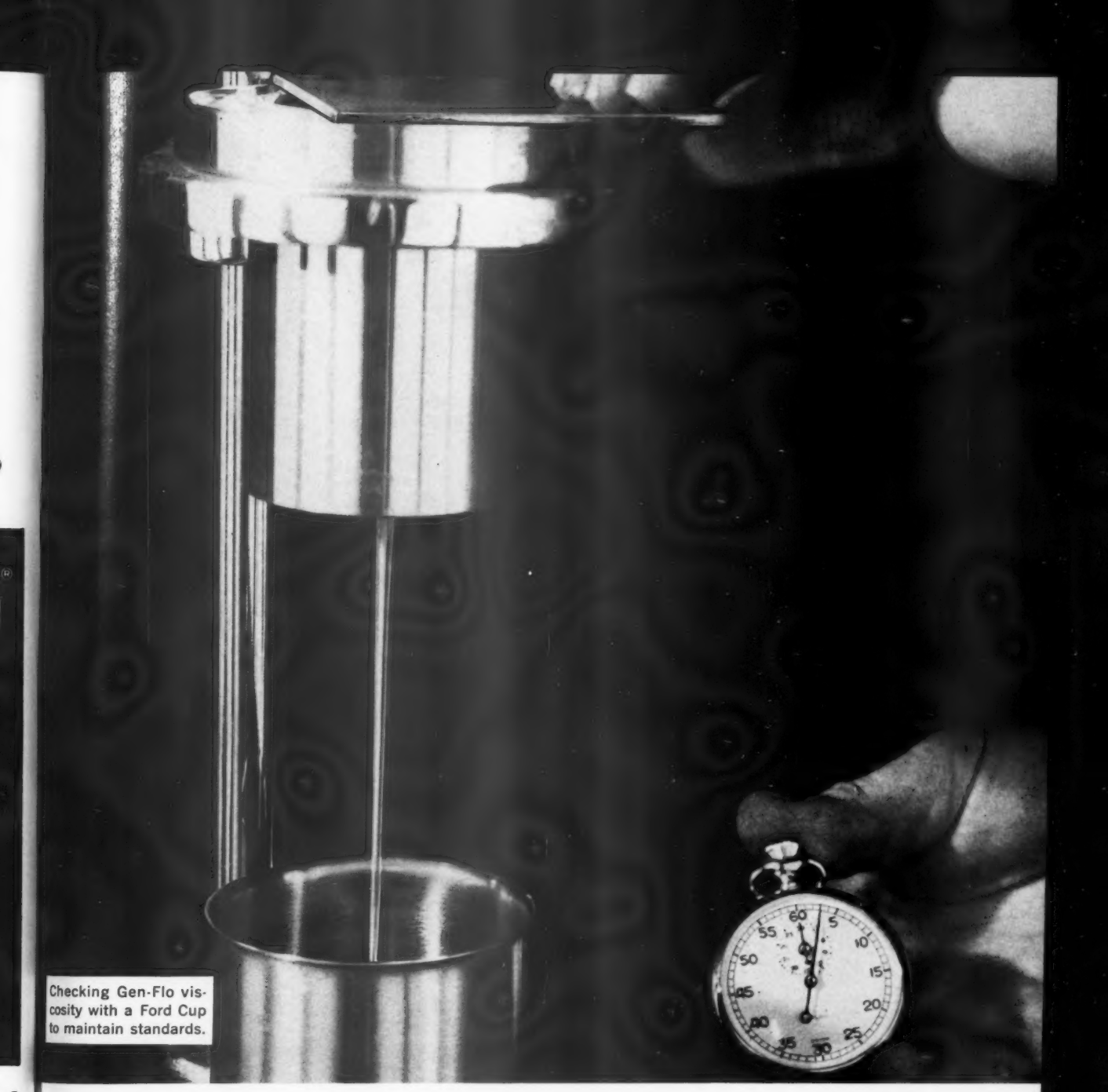

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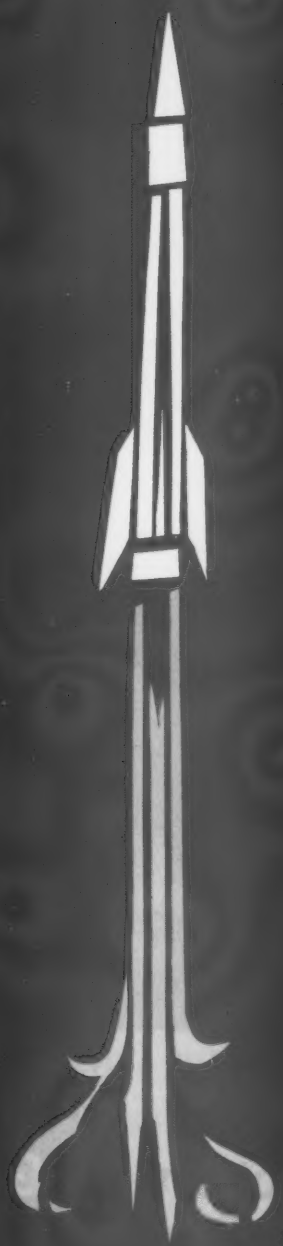

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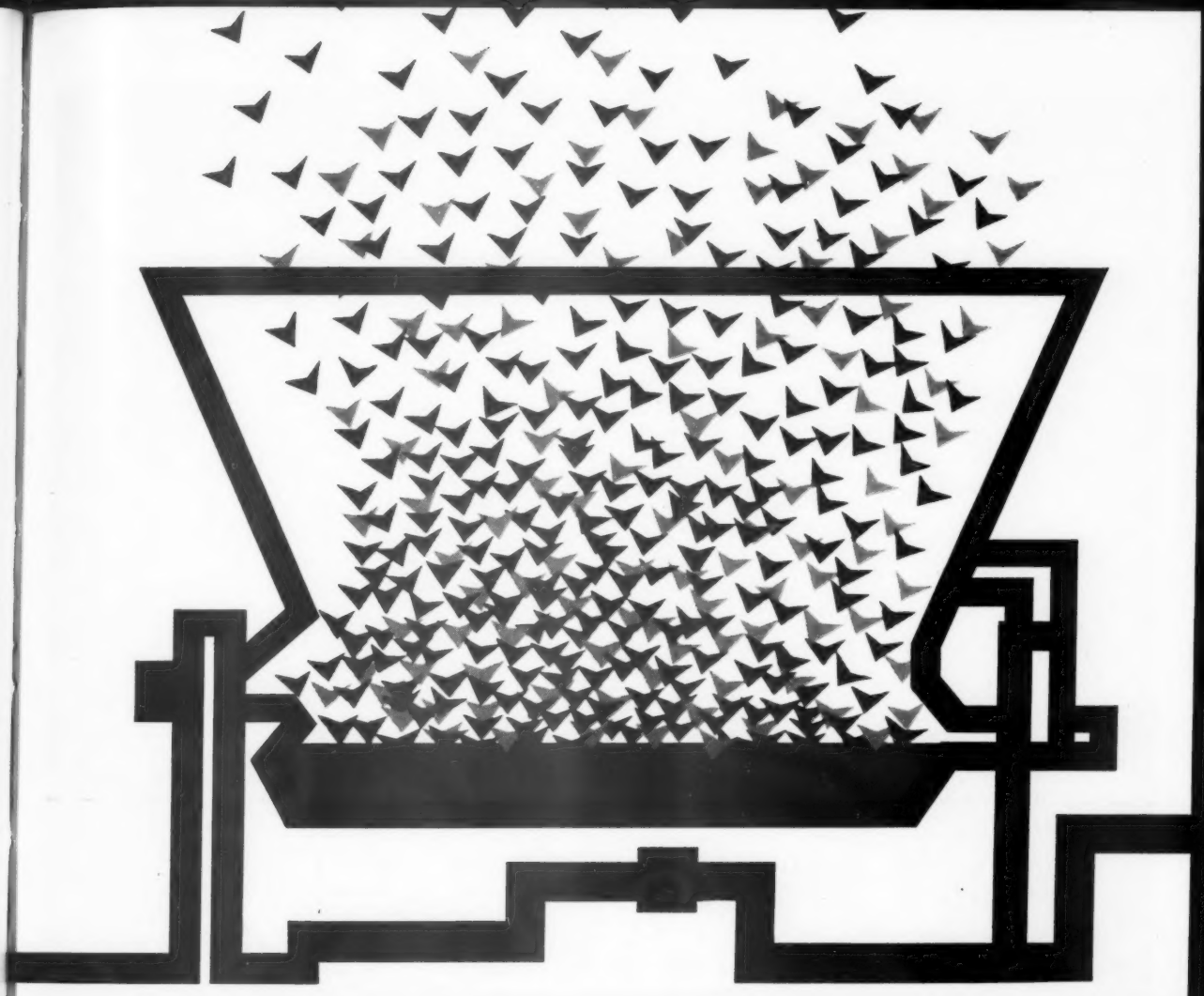

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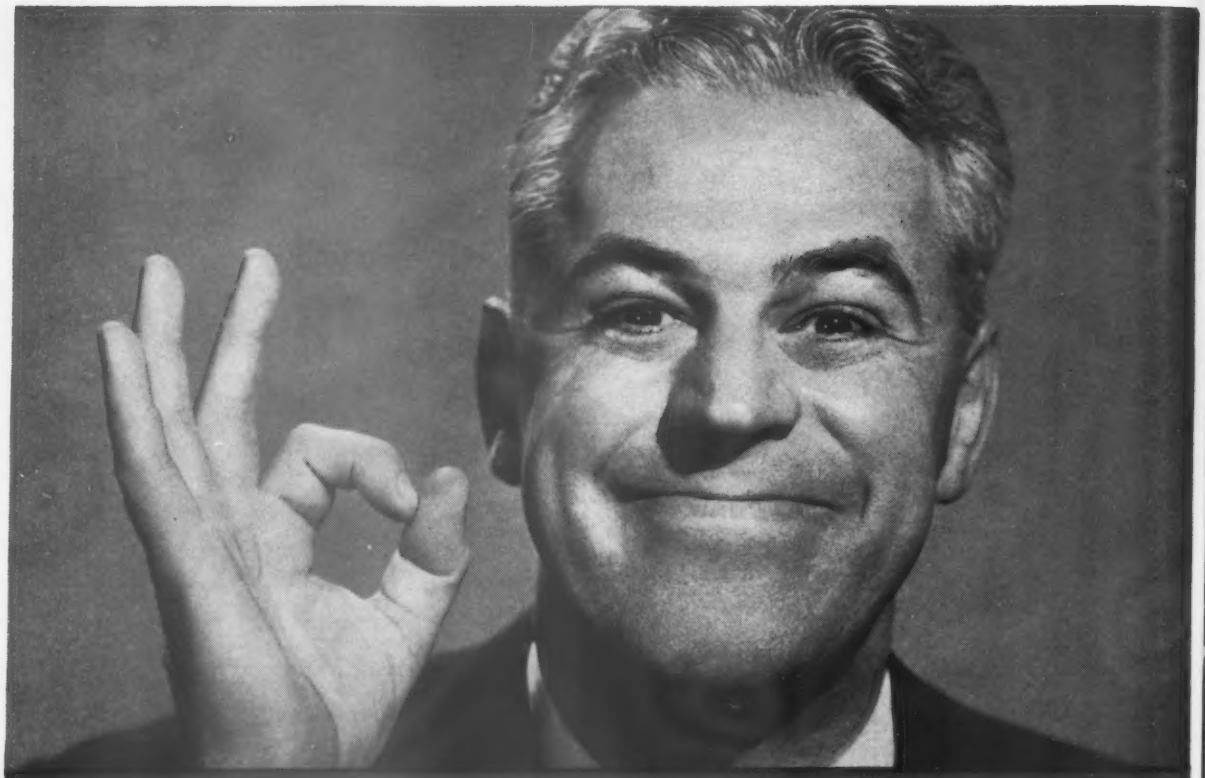

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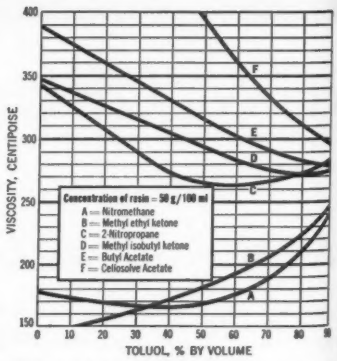

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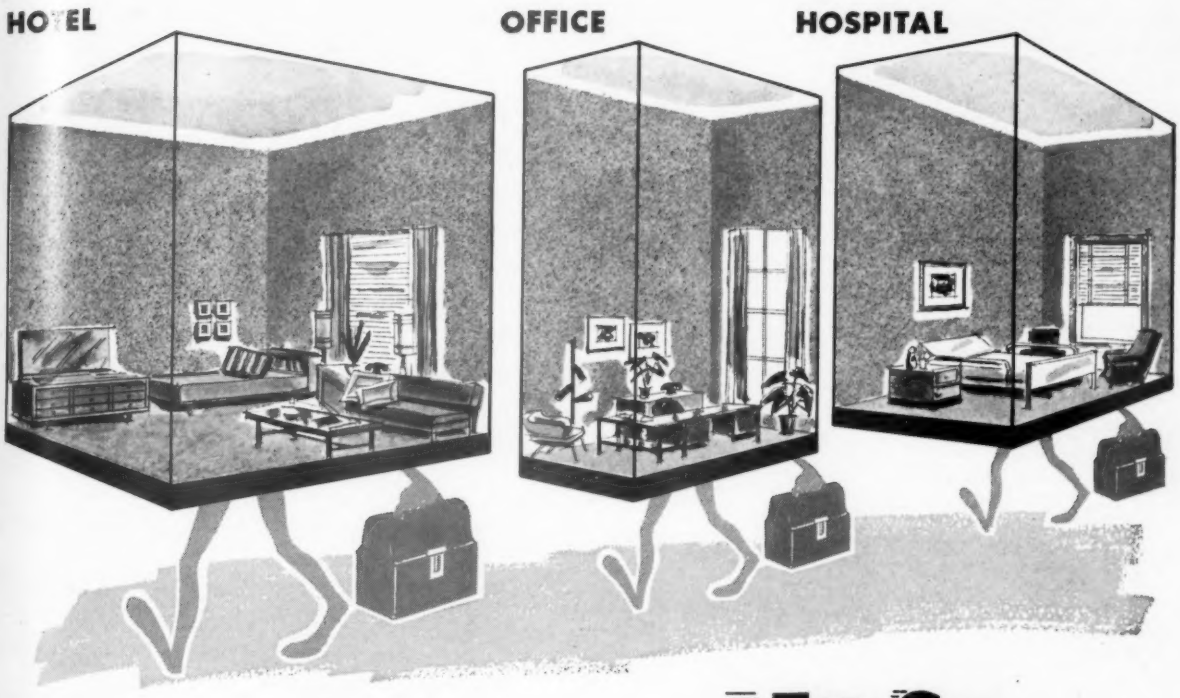

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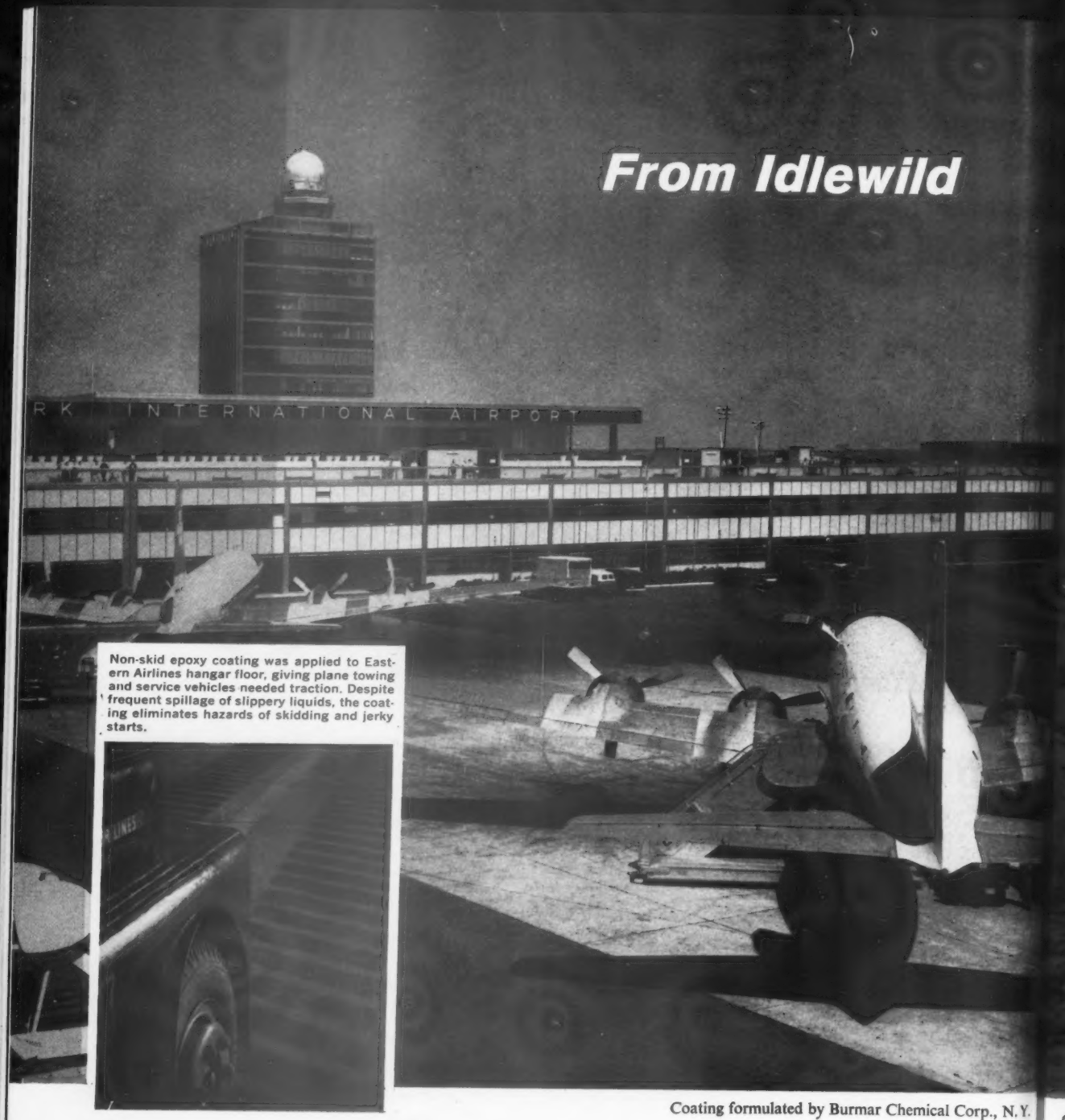

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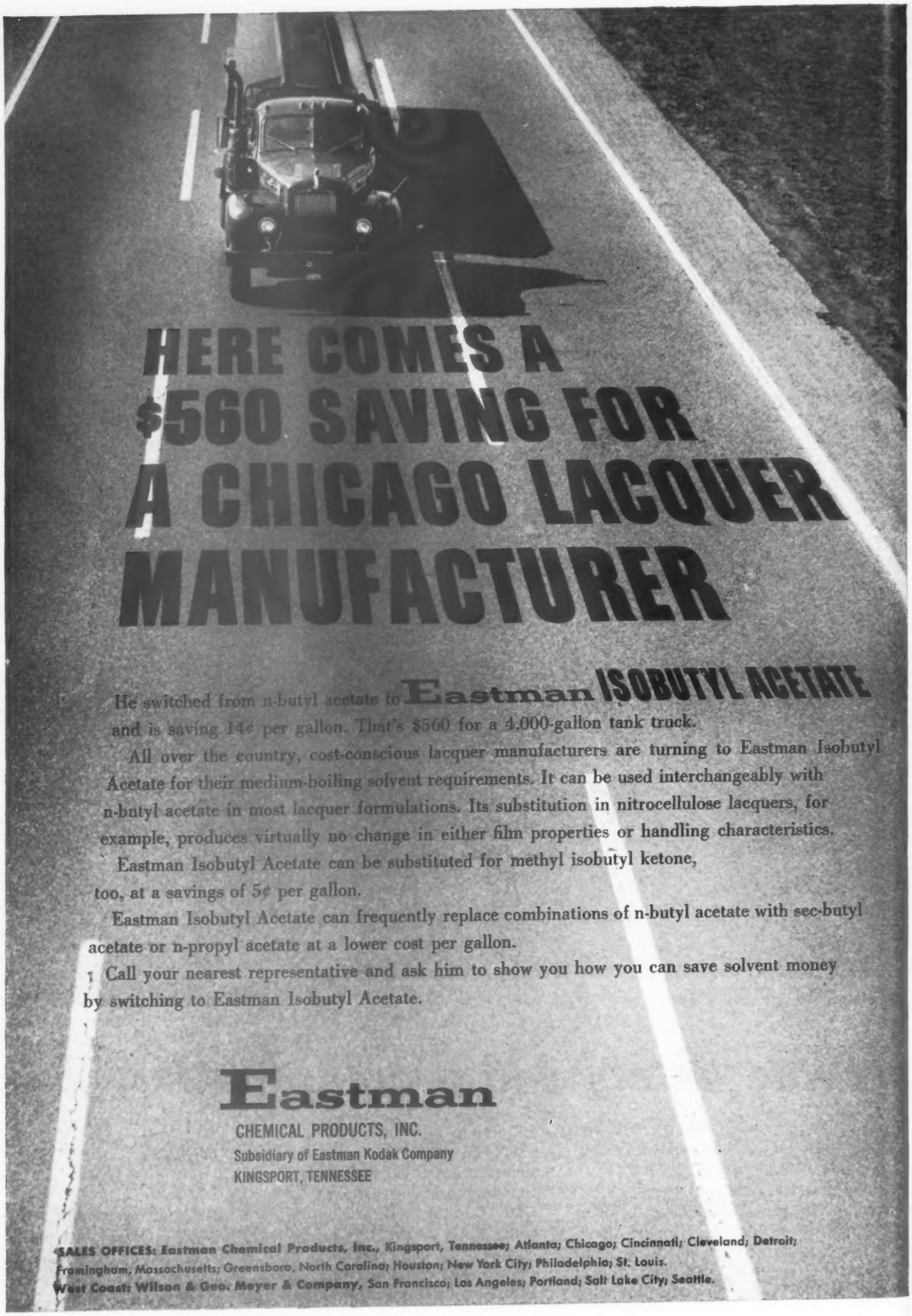

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Containing Tung Oil

By

Paul H. Eaves • J. J. Spadaro • E. L. Patton

ABSTRACT

Data are reported which show that a 100% tung oil varnish formulation (66.7% tung oil, 13.3% zinc resinate, and 20% maleic modified rosin ester) can be processed in large volume vessels at the temperatures required for producing nonchecking varnish and for the long periods of cooking time inherent in the use of such large volume vessels without danger of gelling. Continuous refluxing of the volatiles evolved by the cooking varnish was found necessary to the prevention of gelling if processing time exceeded 4.5 hours. When the volatiles were refluxed cooking could be continued for at least 7.5 hours without gelling.

When the varnishes were cooked in an open vessel with no reflux for from 1.5 to 4.4 hours (the maximum cooking time without gelling) their viscosities ranged from 8.8 to 303 stokes. When cooked in a closed vessel under total reflux for 1.5 to 7.5 hours their viscosities ranged from 1.8 to 103 stokes with no indication of gelling at the longer cooking time.

Dust- and tack-free drying times for the open vessel cooks ranged from 2.3 and 3.3 hours to 3.8 and 4.1 hours, respectively. Corresponding drying time ranges for the varnishes cooked under reflux for from 1.5 to 7.5 hours were 2.6 and 3.6 hours and 4.8 and 5.1 hours.

Batches of the varnish formulation (100 pounds of oil and resins) were cooked in a 30-gallon, Dowtherm heated, closed kettle for as long as 5 hours, the length of cooking time required for a similarly constructed 500-gallon kettle with no indication of gelling.

TUNG oil is one of the oldest of the drying oils, having been known and used in the famous lacquers of ancient China. It is presently accorded recognition as one of the best of the drying oils, drying rapidly to form tough, elastic films which are very resistant to moisture and corrosive atmospheres.

Strangely enough, the very characteristics which make tung oil superior as a drying oil, the unusual structure which causes it to dry rapidly and polymerize readily, make it difficult to use in the preparation of nonchecking ("gas-proof") varnishes and vehicles. When heated to temperatures high enough to effect "gas-proofing" tung oil has a tendency to polymerize rapidly and uncontrollably to form an insoluble, infusible gel, which is worthless and is extremely difficult to remove from the kettle. This tendency of tung oil to uncontrollable gelling has had the effect of limiting tung oil to use in surface coatings which are not required to be gas-proof.

In 1947 it was discovered that when zinc resinate was added to tung oil it could then be cooked without serious danger of gelling (1), i.e. in some manner zinc resinate retarded the polymerization of the oil. While this discovery was a valuable contribution which made it possible to make some use of tung oil in producing gas-proof tung oil varnishes and vehicles, the coatings so produced often required an excessively long time to dry, usually as much as 17 hours or more.

In 1958 a formulation for a tung oil varnish was patented (2) which made use of the polymerization inhibiting quality of zinc resinate and which dried in 3 to 5 hours. In addition to its relatively rapid drying, the varnish produced by the formulation had numerous other advantageous features, not the least of which was its low cost (3). However, the preparation data reported for this varnish covered only a narrow

This paper was presented at the Fall Meeting of the American Oil Chemists' Society in Los Angeles, Calif., Sept. 28-30, 1959.

The authors of this paper are associated with the Southern Regional Research Laboratory, New Orleans, La. This is one of the laboratories of the Southern Utilization Research and Development Div., Agricultural Research Service, U. S. Department of Agriculture.

range of short processing times. As large scale commercial varnish cooking requires the use of large vessels which cannot be heated and cooled at the rapid rates required by the process reported, further investigation was needed to determine the utility of the newly developed formulation for large-scale production of gas-proof tung oil varnish. This paper reports the results of the investigation which was conducted for this purpose. Data are presented which demonstrate conclusively that the tung oil varnish formulation can safely and easily be processed in large-scale equipment to produce a low-cost, gas-proof varnish of good utility. In addition, data are presented which show the effect of varying processing conditions on the properties and characteristics of the varnish.

Experimental

Equipment. The pilot plant preparations of the varnish were made in a closed, jacketed, 30-gallon capacity stainless steel kettle which was heated by pump-circulated liquid Dowtherm. The auxiliary equipment of this vessel comprised a recording temperature controller, a constant speed vane-type agitator, and a vapor condensing system arranged to permit either take-off or return of volatiles. Loading of the kettle was by means of a 4.5 inch diameter charging port which was constructed for vapor-tight closure.

When this vessel was first used for preparing varnish the only method of cooling the charge was by circulating water through an improvised U-shaped coil inserted in the vessel through the open loading port. Subsequently, a heat exchanger was installed in the system which enabled cooling by circulating cold Dowtherm through the jacket of the vessel.

The closed-vessel, laboratory-scale preparations requiring the use of reflux and or nitrogen blanketing were carried out in a 3-neck, 2-liter round bottom flask. Stirring was provided by an air-driven propeller-type agitator installed through a vapor tight packing gland in the center neck of the flask. One side-neck was fitted with a mercury glass thermometer and a nitrogen inlet tube. A 370-mm Vigreaux column was mounted in the other side-neck when a reflux condenser was needed.

The preparations for which no degree of refluxing was desired were made in an open top 2-liter capacity round bottom glass vessel equipped with an agitator and a thermometer. The diameter of the open top of the vessel was approximately the same as that of the vessel.

Both vessels were electrically heated by a standard-type mantle. Control of temperature and heating rate was by means of a manually regulated rheostat.

Materials. The tung oil used was raw American-produced tung oil from commercial sources which complied with the specifications of the American Society for Testing Materials (4)

The zinc resinate contained 8.75% zinc and was the product manufactured and marketed under the trade name of "Zirex" by Newport Industries, Inc.[1] The resin used was a maleic modified rosin ester, the reaction product of rosin, maleic anhydride, and pentaerythritol, which is made by the Hercules Powder Company and sold under the trade name of "Pentalyn G."[1] The mineral spirits used as a thinner was the commercial product having a specific gravity of 0.786, a boiling range of 313-359°F., and a flash point of 104°F.

Cobalt naphthenate containing 6% cobalt and lead naphthenate containing 24% lead were employed in combination as drier.

Varnish Formulation and Preparation. A 25-gallon oil length formulation using a ratio of 5 parts of oil to 1 of zinc resinate was followed in preparing all of the varnishes. The formulation consisted 66.7% of tung oil, 13.3% of "Zirex," and 20% of "Pentalyn G."

The pilot plant preparations each utilized 100 pounds of oil and resins and 100 pounds of mineral spirits to produce batches of approximately 200 pounds of 50% solids varnish. For each of the laboratory cooks 800 grams of oil and resins were used with an equal quantity of mineral spirits as thinner.

The general procedure followed in both the pilot plant and the laboratory preparations was the same. The oil, zinc resinate and rosin ester were charged to the cooking vessel, heated to the gasproofing temperature of 530°F., maintained at or above 530°F. for a sufficient length of time to insure gas-proofing (10 minutes or more), cooled, and thinned in the kettle with mineral spirits to a solids content of about 50%.

For the initial pilot plant preparations no predetermined schedule with respect to heating and cooling times was followed as these cooks were of a preliminary nature with no advance information as to the heating rates and degree of control available. For the two subsequent pilot plant preparations (Figure 1) control of the cooking time and the heating and cooling rates was maintained.

For the first series of laboratory cooks (Table I) the total cooking time was essentially constant at about 6.75 hours with 4 hours of the total time for heating to 530°F. at an even rate, 15 ± 5 minutes for gas-proofing at 530-540°F., and 2.5 hours for cooling

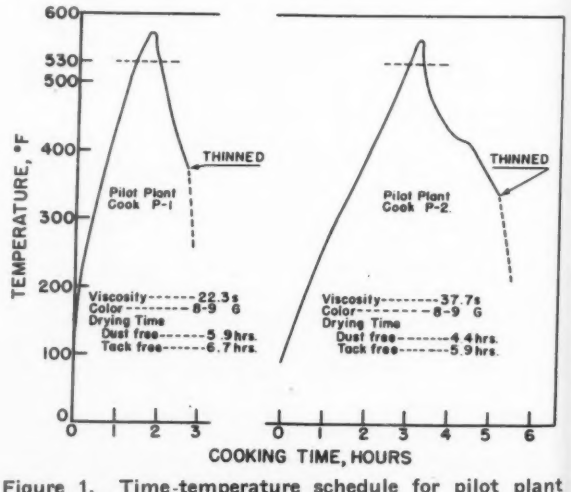


Figure 1. Time-temperature schedule for pilot plant cooks simulating commercial cooking.

1. Mention of names of firms or trade products does not imply that they are endorsed or recommended by the U. S. Department of Agriculture over other firms or similar products not mentioned.

TABLE I

LONG PERIOD LABORATORY COOKS*

Preparation	Cocking time hrs.	Nitrogen blanket	Volatiles refluxed†	Gelling	Viscosity of varnish stokes
			%		
A	6.8	No	60	None	141
A′	7.0	No	40	Trace	270
B′	4.7*	Yes	0	Complete	—
C	4.6*	Yes	0	Complete	—
C′	4.7*	Yes	0	Complete	—
D	6.8	No	100	None	62
D′	6.9	No	100	None	59
E	6.7	Yes	90	None	82

*Time-temperature schedule for all cooks; heat to 530°F. in 4 hours, hold at 530-540°F. for 15 ± 5 minutes, cool to 300°F. in 2.5 hours Short cooking times are times at which gelling occurred.
†Percentage of volatiles refluxed estimated.

to 300°F. For the additional laboratory cooks in which the total cooking time varied from 1.5 to 7.5 hours, two-thirds of the total cooking time, exclusive of 15 ± 5 minutes for gas-proofing at 530-540°F., was used in heating at an even rate to 530°F., with the remainder of the time for cooling evenly to 300°F.

Methods of Testing. All tests of the varnishes for viscosity, color, and acid value were made on samples which had been adjusted by the addition or removal of mineral spirits to 50 ± .2% solids and were carried out by the methods of the American Society for Testing Materials (4) as described under Designation 154-56 of Standard Methods of testing Varnishes. Viscosities were determined by the direct method using Gardner-Holdt bubble tubes, color was measured by comparison with standard Gardner color solutions, and acid number was found by titration in neutral benzene-ethanol solvent.

Drying and gas checking tests were conducted on samples adjusted to 40% solids content with mineral spirits. The drier employed, naphthenates of cobalt and lead in combination, were added to the 40% solids samples in the amounts required to supply 0.05% cobalt and 0.50% lead (as the metals) based on the solids content of the varnish samples. After addition and blending of the drier the samples were aged overnight in closed containers under nitrogen before testing.

The films tested for drying time were cast on bright tin plate with a doctor blade having a clearance of 3 mils. Films tested for gas checking were flowed on bright tin plate panels with a small brush.

The dust-free drying time of the films was found by a modification of the ASTM calcium carbonate method (4), the modification consisting of depositing the calcium carbonate on the film at 15-minute intervals with a small spatula rather than by means of the applicator described in the method. The films were considered to have dried dust-free at the time interval when the calcium carbonate could be completely removed by light wiping with a solft cloth.

Tack-free drying time was determined by touching the films lightly with the finger tip at 15-minute intervals. When no trace of tack could be detected the films were considered to be tack-free.

The gas checking tests were conducted by use of the bell jar test method as described under Tentative Methods of Testing Varnishes, D154-57T of the American Society for Testing Materials.

Results and Discussion

The first varnish made in conducting this investigation was prepared in pilot plant equipment. This preparation consisted of two batches which were cooked for 4.2 and 3.5 hours, respectively, with the loading port of the kettle open. The two batches were thinned and combined to produce 394.5 pounds of varnish containing 50.5% solids, a yield of 99.6% of the input oil and resins as varnish solids. After adjustment of its solids content to 50%, the viscosity of this varnish was 34.7 stokes (letter value, Z2) and its color was 11 to 12 on the Gardner scale. Dust and tack-free drying times were 4.2 and 5.2 hours, respectively. This product was gas proof and proved to be an excellent wood sealer when thinned to 25% solids with naphtha. It was a good general purpose varnish at higher solids content but was not well adapted for use as a paint vehicle because of its high viscosity.

Large volume manufacturers had evidenced interest in the varnish but indicated that the cooking time used in its preparation was somewhat shorter than the time required when using similar but larger size equipment. They pointed out that for some existing 1000- to 1500-gallon kettles, the time required for heating to gas proofing temperature might be as much as 4 hours, with an additional 3 hours being required for cooling. For 500-gallon kettles the respective heating and cooling times would be about 2.5 to 3.0 hours and 1.5 to 2.0 hours.

The most extreme of these conditions were employed in conducting the long cooking period labora-

tory experiments, the conditions and results of which are shown in Table I. All of these experiments followed essentially identical schedules; 4 hours for heating, 15 ± 5 minutes for holding, and 2.5 hours for cooling.

Preparations A and A′ were carried out with one neck of the flask open to the atmosphere. While the varnishes produced did not gel they were very viscous and had a color of 11 on the Gardner scale. It was thought that these results might have been due, at least in part, to oxidation of the varnish by contact with air through the open vent. To eliminate air oxidation preparations B and B′ were cooked under a slowly flowing blanket of nitrogen. Surprisingly, both preparations gelled solidly and completely shortly after passing through the gas proofing stage after being cooked for 4.7 hours. It was thought that perhaps the nitrogen used for blanketing had contained enough oxygen to precipitate gelling. Preparations C and C′ were then carried out, using nitrogen which had been passed through alkaline pyrogallol, with results exactly the same as for preparations B and B′.

A review of the observations made while conducting the preceding cooks (A through C′), showed that when blanketing had not been used a portion of the volatiles evolved had refluxed from the sides of the flask, whereas when nitrogen had been used the volatile material had been swept out of the flask and none of it had refluxed. Based on this observation, preparations D and D′ were cooked with a reflux condenser mounted in the vent and without the use of nitrogen. Both of these cooks were continued for the full scheduled cooking time, and no tendency to gelling was noted. To confirm the effect of reflux on gelling, preparation E was cooked using both reflux and nitrogen blanketing. The varnish produced by this cook was somewhat more viscous than that from the D and D′ preparations, but there was no indication of gelling. The higher viscosity found for the varnish cooked under reflux but with a nitrogen blanket is attributable to some of the volatiles being carried through the condenser by the nitrogen stream.

Information obtained from the laboratory cooks was applied in the conduct of two pilot plant cooks, P1 and P2, the schedules for which are shown by Figure 1. Complete and rapid reflux of the volatiles evolved by the cooking varnish was not possible with these cooks because of holdup of condensate in the horizontal condenser with which the kettle was equipped; however, the maximum degree of reflux obtainable was used.

The cooking schedule for the first of the two pilot plant preparations, P1, simulated that obtainable in a 200 to 250 gallon commercial kettle and was for a total time of 2 hours and 40 minutes. Thinning was done in the kettle when the temperature had dropped to 370°F. in order to terminate cooking at the desired time. The varnish produced by this cook was gas proof, had a viscosity of 22.3 stokes (Z), and a Gardner color of 8 to 9 at 50% solids. Its dust-and tack-free drying times were 5.9 and 6.7 hours, respectively.

The cooking time for the second of the pilot plant cooks, P2, was extended to 5 hours and 10 minutes to simulate the schedule obtainable in a similarly constructed 500-gallon kettle. Thinning of this varnish was done in the kettle when its temperature had dropped to 340°F. in order to terminate cooking. The 50% solids varnish produced had a higher viscosity than that from the shorter cook, 37.7 stokes (Z2) but its color was the same. The varnish from the longer period cook, however, dried more rapidly than that from the short period cook, its dust-free time being 4.4 hours and tack-free time 5.9 hours. This varnish also passed the gas checking test.

These two pilot plant cooks, despite the inadequate reflux, demonstrate that by refluxing the volatiles evolved by the cooking varnish the tung oil varnish formulation under investigation can be cooked in commercial size equipment without danger of gelling to produce gas proof varnish of good utility.

Additional laboratory scale cooks were conducted to determine the effect of the length of cooking time and the use or nonuse of volatiles reflux on the gas proofness, color, acid value, viscosity, and drying rate of the varnish. It was found that neither the length of cooking time nor reflux affected gas-proofness. All of the varnishes prepared, in both the closed and the open vessel, with cooking times ranging from 1.6 to 7.5 hours, withstood the gas checking test with no evidence of wrinkling or checking.

The varnishes prepared in the closed vessel under total reflux ranged in color from 9 to 11 on the Gardner scale, tending to be darker with increasing length of

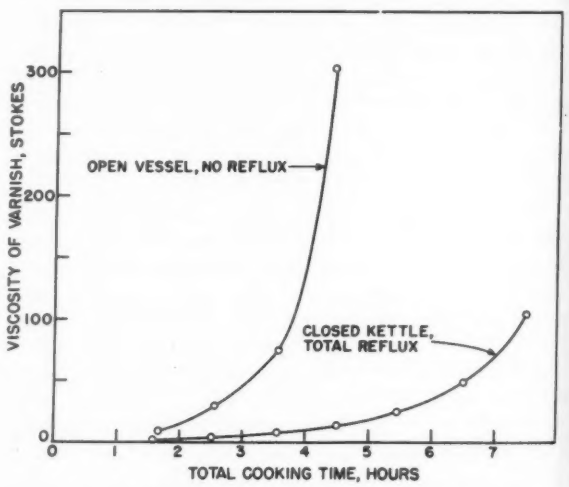
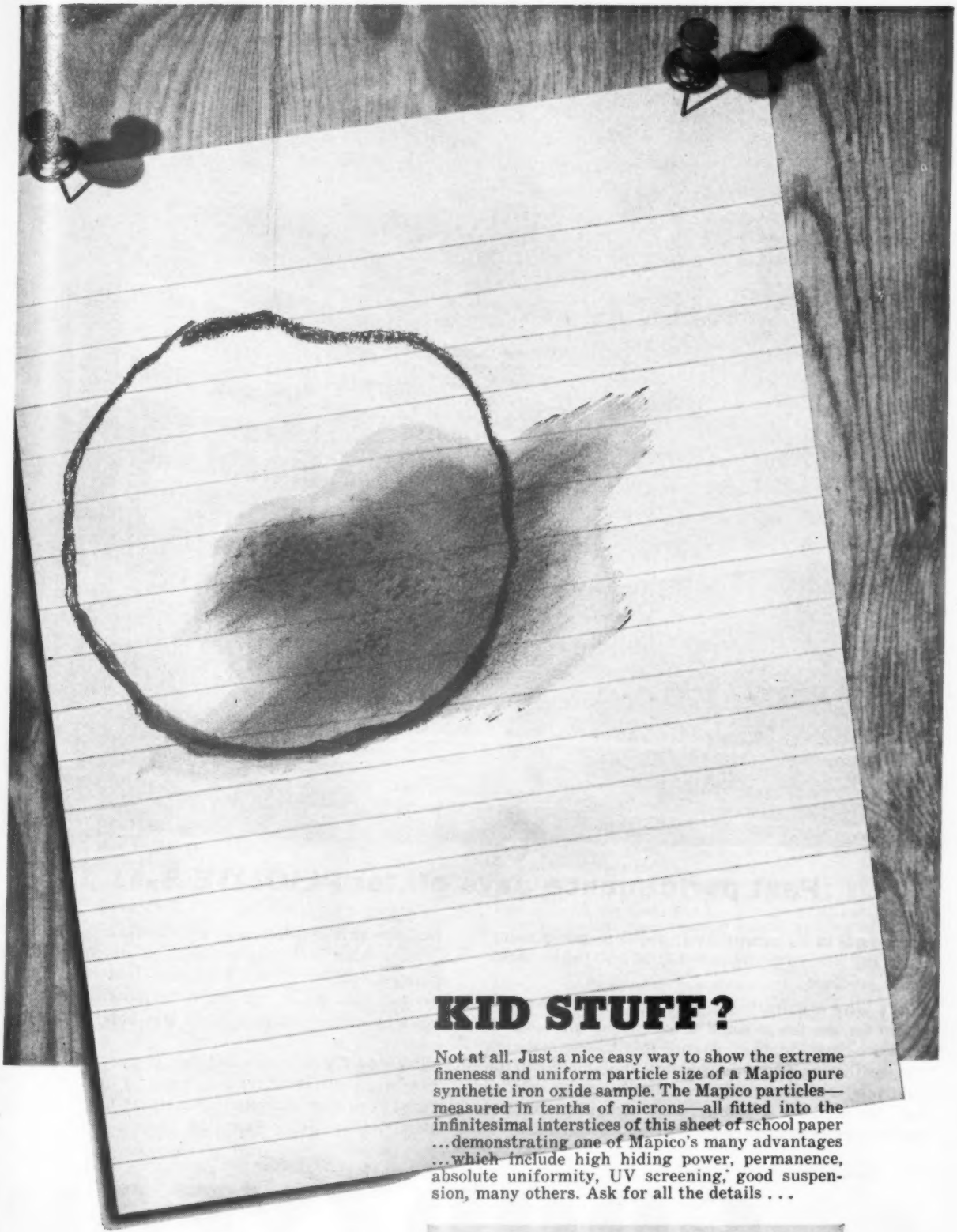


Figure 2. The effect of cooking time and reflux on the viscosity of the varnishes.

cooking time. The varnishes cooked in the open vessel exposed to air were uniform in color, 11 to 12 on the Gardner scale, and their colors did not appear to be related to cooking time.

The acid values of the varnishes cooked for 2.5 and 4.4 hours, with and without reflux, were determined. Acid values for the 2.5-hour cooks, with and without reflux, were 14.0 and 10.9, respectively, while corresponding values for the 5-hour cooks were

(Turn to page 82)



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TUNG OIL—RESIN VARNISH VEHICLE

A Preliminary Cost Analysis

By

K. M. Decossas
P. H. Eaves
S. P. Koltun
E. F. Pollard

ABSTRACT

Tung oil-resin varnish vehicle is produced from tung oil and rosin by a process, developed by the Southern Utilization Research and Development Division, which prevents gelation. This low-cost general purpose varnish is being produced by several manufacturers and used as a floor sealer and finish coat.

Details of the process and hypothetical plants are described for producing the 50 percent solids product in 200- , 500- , 1000- , and 1500-gallon batches. Investment costs, operating costs, general expenses, and a cost analysis are given for producing the 50 percent solids mixture during 10 percent of the operations of the hypothetical plants. Costs are also given for the manufacture of a 25 percent solids mixture for use as floor sealer.

Costs for producing 50 percent solids tung oil-resin varnish vehicle of 15-gallon and 25-gallon oil lengths have been estimated to range from $1.27 per gallon at an annual production of 680,000 gallons, to $1.50 per gallon at an annual production of 10,000 gallons. A combination of annual production requirements, total plant cost (capital investment), and equipment preferences of the manufacturer are reported as the main considerations in selecting the size, type, and number of kettles. Additional costs for thinning the 50 percent solids mixture with an equal volume of V.M. & P. Naphtha for use as floor sealer were estimated to be 12.6 to 26.7 cents per half-gallon of 50 percent solids mixture, resulting in costs of $0.76 to $1.02 per gallon of 25 percent solids mixture.

TUNG oil-resin varnish vehicle is produced from two agricultural commodities, namely, tung oil and rosin, by a process which prevents gelation (1, 2). In laboratory work, Goldblatt and Hopper (2) developed a formula for the preparation of a varnish vehicle which would not gel under normal cooking conditions. Hopper produced 50-gallon batches of the varnish vehicle in an open kettle for commercial use. To develop this product and process, and establish optimum processing conditions for commercial production, Eaves, Spadaro, et al (1), continued this investigation on both laboratory and pilot plant scales. They report conditions required for processing in both open and closed kettles.

The product of this research at the Southern Regional Research Laboratory is a low-cost general purpose varnish, which dries fairly rapidly to a hard, glossy finish. Several manufacturers are producing and selling it for use as a floor sealer and finish coat.

A public service patent, U. S. Patent No. 2,829,064, has been granted on the process and is available for licensing to United States manufacturers without cost.

In this paper, investment costs, operating costs, general expenses, and a cost analysis are given for producing 50 percent solids tung oil-resin varnish vehicles of 15-gallon and 25-gallon oil lengths in hypothetical plants during 10 percent of their operations. Costs are also given for the manufacture of a 25 percent solids mixture for use as floor sealer. The costs are for producing the product in 200-, 500- , 1000- and 1500-gallon batches.

This paper was presented at the American Oil Chemists' Society meeting, Los Angeles, Calif. on September 28-30, 1959.

The authors of this paper are associated with the Southern Regional Research Laboratory, New Orleans, La. This is one of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, U. S. Department of Agriculture.

Process and Plant

General

The process for producing 50 percent solids tung oil-resin varnish vehicle is diagrammed in Figure 1, and consists of heating a mixture of specified proportions of tung oil, zinc resinate, and maleic modified rosin ester, to a temperature of 530°F., gasproofing the mixture at 530°F. for at least ten minutes, cooling

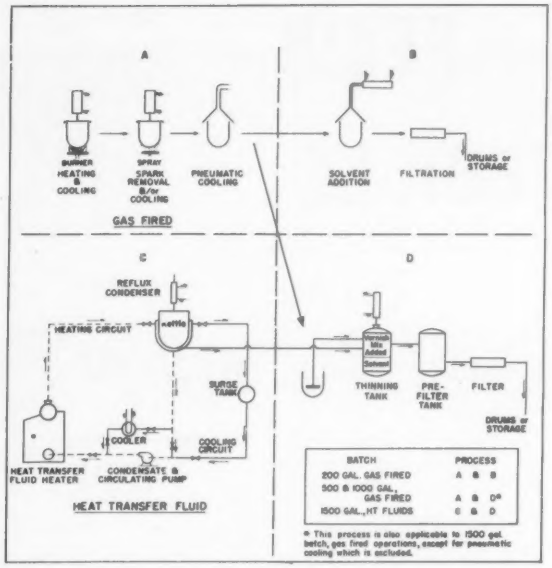

Fig. 1. Tung Oil-Resin Varnish Vehicle Process Flow Sheet.

to about 340°F., thinning with an equivalent weight of mineral spirits, and filtering. The retention of the vapors in contact with the mixture during heating, gasproofing, and initial cooling to 390°F. is necessary in order to avoid gelling of the mixture, if the cooking time exceeds four and one-half hours.

It is assumed that a drier would be added by the purchaser. From laboratory work, it was found that a suitable drier for this formulation would be one using cobalt naphthenate (containing 6% cobalt) and lead naphthenate (containing 24% lead) in combination. This drier would be added after thinning to 50 percent solids, and in such proportions as to supply 0.05% metallic cobalt and 0.5% metallic lead, on the basis of varnish solids.

200-gallon batches

200-gallon batches are prepared in 250-gallon portable kettles, equipped with covers and reflux condensers, and gas fired in compartments having sub-surface burners. The kettles and their contents are cooled under a hood. Thinning is done in the kettles under a hood provided with a reflux condenser for recovery of vaporized mineral spirits. Filtering is accomplished in a batch horizontal plate filter. The time-temperature cooking curve for processing a 200-gallon batch is shown in Figure 2. Heating time is 1½ hours, gasproofing time is 10-30 minutes, cooling time is ½ hour, thinning time is 10 minutes, and filtering time is ½ hour.

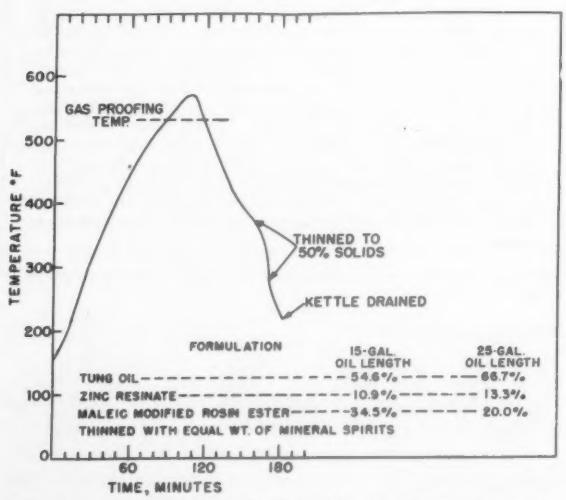

Figure 2. Time-temperature cooking curve for tung oil-resin varnish vehicle. Cooking time — 2-1/2 hours.

For 200-gallon batches, annual productions of from 10,000 gallons to 240,000 gallons of 50 percent solids tung oil-resin varnish vehicle were considered. An annual production of 10,000 gallons is the output of tung oil-resin varnish vehicle during 10 percent of the operation of one 250-gallon kettle, operating for 8 hours daily, 250 days per year. Similarly, the annual production of 240,000 gallons is the output during 10 percent of the operation of eight 250-gallon kettles, operating for 24 hours daily, 250 days per year. Three and five kettle combinations were considered in between these.

500-gallon batches

Materials for 500-gallon batches are cooked in 250-gallon portable kettles of the same specifications as those used for processing 200-gallon batches. However, thinning is done in a thinning tank. The cooking cycle is of the same duration as that for the smaller batch.

For 500-gallon batches, annual productions of from 25,000 gallons to 600,000 gallons were considered.

1000-gallon batches

Materials for the 1000-gallon batches are heated, gasproofed and cooled in 560-gallon portable kettles.

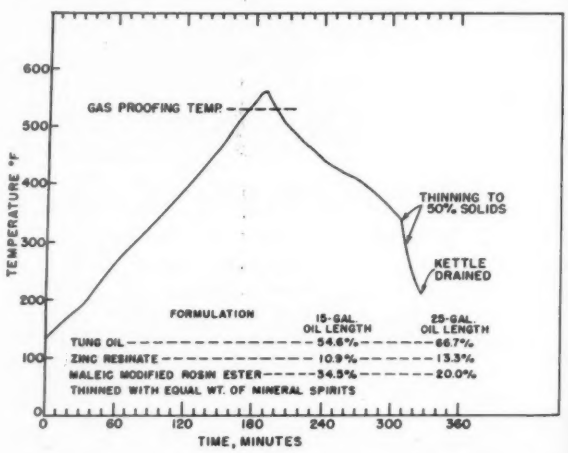

Figure 3. Time-temperature cooking curve for tung oil-resin varnish vehicle. Cooking time — 5 hours.

Thinning is done in a thinning tank. As shown in Figure 3, the cooking cycle is considerably longer than the 2½ hours for the 200-gallon and 500-gallon batches. Because of the batch size, cooking time is increased to five hours. This consists of 3 hours for heating, 10-30 minutes for gasproofing, and 1½ hours for cooling.

For 1000-gallon batches, annual productions of from 100,000 gallons to 680,000 gallons were considered.

Table 1
COSTS FOR PRODUCING
TUNG OIL-RESIN VARNISH VEHICLE
15 Gallon Oil Length

Production, Gals./Yr.[1]	10,000	30,000	50,000	80,000	240,000	25,000	600,000
Batch Size, Gals.	200	200	200	200	200	500	500
No. of Kettles	1	3	5	8	8	1	8
Annual Operation-Days	250	250	250	250	250	250	250
Daily Operation-Hours	8	8	8	8	24	8	24
Total Plant Cost (Dollars)	44,253	86,203	106,578	157,086	157,086	108,719	278,414
Manufacturing Cost ($/Gal.)							
Direct Costs	1.14	1.08	1.08	1.07	1.06	1.08	1.03
Chemicals (Raw Materials)	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Labor	.09	.04	.05	.04	.04	.04	.01
Utilities	.01	.01	.01	.01	.01	.01	.01
Other	.03	.02	.01	.01	.01	.02	
Indirect Costs (Payroll overhead, gen. plant overhead, control lab. and packaging cost)	.08	.06	.06	.05	.05	.06	.05
Fixed Costs (Insurance, taxes and depreciation)	.05	.03	.02	.02	.01	.05	.01
Contingencies	.06	.06	.06	.06	.05	.06	.05
General Expenses	.17	.15	.15	.14	.13	.16	.13
Total	1.50	1.38	1.37	1.34	1.30	1.41	1.27

			Gas Fired		Heat Transfer oil	Liquid Dowtherm	
Production, Gals./Yr.[1]	100,000[2]	680,000[2]	112,500	562,500	112,500	112,500	562,500
Batch Size, Gals.	1000	1000	1500	1500	1500	1500	1500
No. of Kettles	1	8	1	5	1	1	5
Annual Operation-Days	250	250	250	250	250	250	250
Daily Operation-Hours	24	24	24	24	24	24	24
Total Plant Cost (Dollars)	169,349	418,998	239,555	627,480	224,445	274,940	526,310
Manufacturing Cost ($/Gal.)							
Direct Costs	1.05	1.03	1.05	1.03	1.05	1.05	1.03
Chemicals (Raw Materials)	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Labor	.03	.01	.02	.01	.02	.02	.01
Utilities	.01	.01	.01	.01	.01	.01	.01
Other			.01		.01	.01	
Indirect Costs (Payroll overhead, gen. plant overhead, control lab. and packaging cost)	.06	.05	.06	.05	.06	.06	.05
Fixed Costs (Insurance, taxes and depreciation	.02	.01	.02	.01	.02	.03	.01
Contingencies	.06	.05	.06	.06	.06	.06	.06
General Expenses	.14	.13	.14	.13	.14	.14	.13
Total	1.33	1.27	1.33	1.28	1.33	1.34	1.28

1. Based on production of tung oil-resin varnish vehicle during 10 percent of operations.
2. Productions are based on time schedules prepared for processing in the various combinations of kettles. Four batches would be prepared per day in one kettle, and 17 batches per week per kettle for 8 kettles.

1500-gallon batches

Materials for the 1500-gallon batches are prepared both in 1000-gallon gas fired set kettles and in 1000-gallon fluid heated set kettles. Heating fluids considered are Dowtherm A[1] and heat transfer oils. The cooking cycle is 5 hours, the same as that for 1000-gallon batches. Thinning is done in a thinning tank.

For 1500-gallon batches, annual productions of from 112,500 gallons to 562,500 gallons were considered.

Costs

Total physical plant costs were calculated by adding to the installed cost of the above mentioned equipment allowances of 45 percent of installed equipment cost for process piping, 10 percent of the cost of selected equipment units for instrumentation, and costs of auxiliary facilities and buildings. Total plant costs reported in Table 1 were calculated from the total physical plant costs by allowing an additional 25 percent and an additional 10 percent of total physical plant cost for engineering and construction, and contingencies, respectively.

Costs for raw materials for the 15-gallon and 25-gallon oil length vehicles are given in Table 2. The difference in raw materials costs for the two formulations is of the order of magnitude of one cent per gallon. Labor requirements for the various combina-

1. The mention of trade products anywhere in this article does not imply their endorsement by the Department of Agriculture over similar products not mentioned.

Table 2
Raw Materials Cost

Formulation	15-gallon	25-gallon
Tung Oil	6.15	6.35
Zinc Resinate (Zirex-Zn Content-8.75%)	1.80	2.21
Maleic Modified Rosin Ester (Pentalyn G)	3.54	3.07
Mineral Spirits	2.07	2.07
	13.56 cents/lb. or $1.01/gal.	13.70 cents/lb. or $1.02/gal.

Table 3
Labor Requirements

No. of Kettles	1	3	5	8
Supervisor			1	1
Cooker	1	1	1	2
Helper	1	1	1	1
Thinner		1	1	1
Filter			1	1

tions of kettles are given in Table 3.

Utility costs include those for gas, electricity, and cooling water. Gas costs were derived using the natural gas schedule of the local utility company.

Electric power costs were estimated by calculating the 15-minute demand loads for the electrical equipment and applying the appropriate demand and energy charges as listed in the local electric schedule for commercial and industrial purposes. Cooling water costs were calculated using a schedule of prevailing industrial water rates supplied by the local water board.

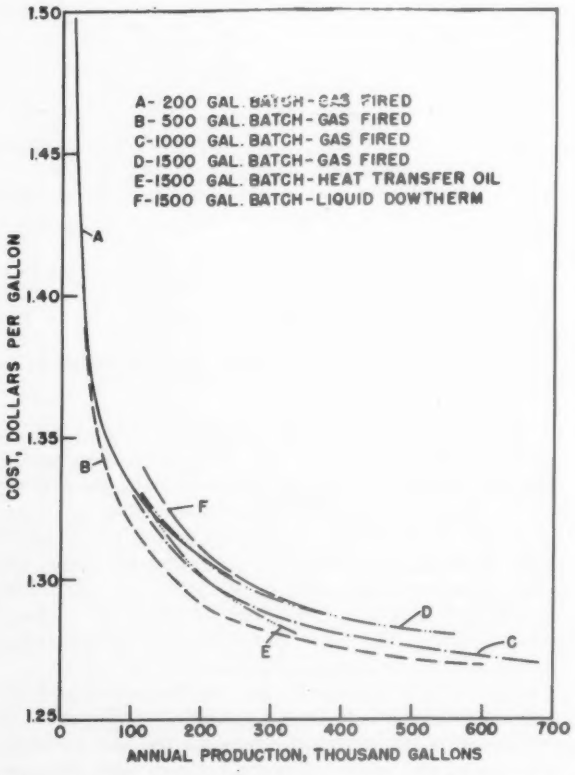

Figure 4. Production costs tung oil-resin varnish vehicle.

General expenses are those for general administration and office overhead, financing, and sales costs.

All operating costs are reported in Table 1 and plotted in Figure 4.

Additional investment and operating costs incurred by thinning approximately 25 percent of the annual production of the 50 percent solids mixture in the smallest and largest plants with an equal volume of V. M. and P. Naphtha for use as a floor sealer are given in Table 4. Thinning to approximately 25 percent solids for use as a floor sealer would cost an additional 26.7 cents per half-gallon of 50 percent solids mixture at the low production level and 12.6 cents per half-gallon of 50 percent solids mixture at the high production level, resulting in costs of $1.02 and $0.76 per gallon of 25 percent solids mixture, respectively.

Table 4
Additional Costs for Producing Tung Oil Varnish Floor Sealer

Production, Gals/Yr.		5,000		340,000
Batch Size, Gals.		400		2,000
Total Plant Cost (Dollars)		3,080		16,965
Manufacturing Cost (¢/Gal.)				
Direct Costs		11.7		8.2
Chemicals	7.8		7.8	
Utilities	0.3		0.1	
Other	3.6		0.3	
Indirect Costs		1.9		1.9
Packaging Cost				
Fixed Costs (Insurance, taxes and depreciation)		6.7		0.5
Contingencies		1.0		0.5
General Expenses		5.4		1.5
Total		26.7		12.6

Analysis of Costs

Raw materials costs account for up to 80 percent of production cost, and general expenses (consisting of general administration and office overhead, financing, and sales costs) account for about 10 percent.

It is apparent from Figure 4 that production costs decrease rapidly from $1.50 per gallon at an annual production of 10,000 gallons, down to about $1.32 per gallon at an annual production of 100,000 gallons. For productions between 100,000 gallons and 600,000 gallons annually, costs decrease only about five cents per gallon. There is little difference in production costs (about one cent per gallon) for processing in the various types of kettles, namely, in portable or fixed gas fired kettles, or in fixed kettles using heat transfer oil or liquid Dowtherm. (See Curves C, D, E and F of Figure 4). Batch size has little apparent effect on costs as is shown by Curves A, B, C, and D of Figure 4. For a given production, Curves A, B, C and D are within 2 cents per gallon of each other. From this, it follows that a combination of annual production requirements, total plant cost (capital investment), and equipment preferences of the manufacturer would be the main considerations in selecting the size, type, and number of kettles. For 1500-gallon batch preparation, capital investment for heating in set kettles with heat transfer oil is less than that for gas

(Turn to page 83)

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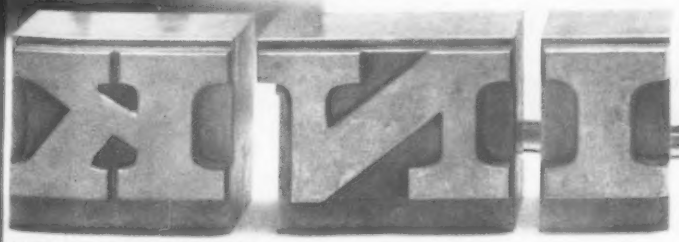

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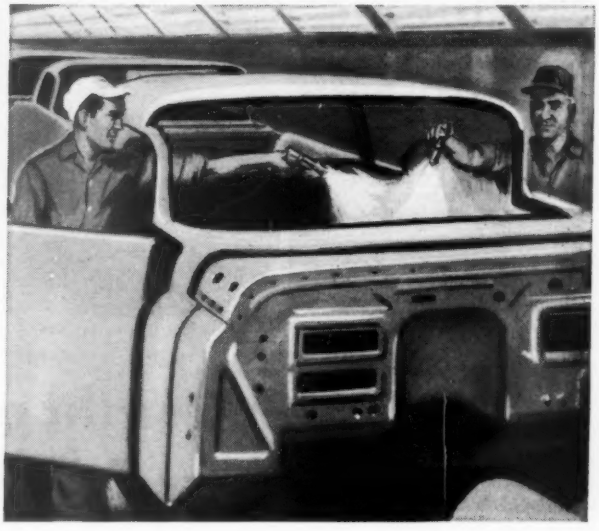

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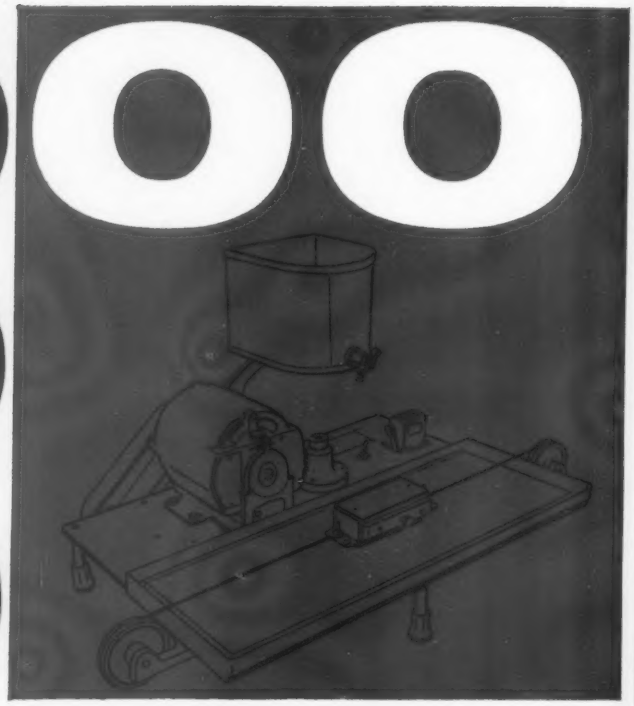

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SHAWINIGAN RESINS

A MELAMINE—ACRYLIC WATER SOLUBLE RESIN FOR INDUSTRIAL FINISHES

By
W. H. Hensley
and
H. J. West

As a result of continued developments and refinements during the past ten years in the technology of water thinned paints, latex paints have taken a firm hold in architectural finishing and the success of these finishes has spurred the synthetic resin and paint chemists in their efforts to develop water-borne finishes for the industrial field. Success in this endeavor will bring far reaching benefits, for it means the elimination of the ever present fire and health hazards in the use of large volumes of organic solvents in the paint factory and finishing shop.

Acrylic emulsion polymers have proved ideal in many respects in the formulation of interior and exterior flat finishes. Renowned for their lack of color, resistance to yellowing and their good durability, acrylics have been highly successful in white and pastel finishes either when applied as emulsion flats or as solvent type high gloss lacquers. Melamine resins, equally as good as acrylics in freedom from color and in non-yellowing, for almost 20 years have contributed to automotive finishes, surface hardness and resistance to water, chemicals, grease and solvents. A marriage of these two types of resin showed promise of producing an ideal vehicle for industrial and decorative finishes and has been an important objective of Cyanamid research during recent years.

A successful outcome of this work was realized in 1959 with the announcement of "Melaqua" 600* a melamine-acrylic water soluble resin. It is not an emulsion, but a clear solution in water which may be formulated into clear or pigmented enamels by conventional techniques. When these enamels are baked, the acrylic polymer is crosslinked with the melamine component to form a hard, durable and high gloss finish.

Attempts to formulate finishes with latices have met with some success in applications such as industrial primers where high gloss is not required, but little progress has been made in formulating high gloss enamels. Latices are dispersions in water of solid particles and the high degree of wetting of pigments which is necessary to develop high gloss has not yet been achieved. This problem is overcome by the use of a stable, true solution as now available to industry in "Melaqua" 600.

This new resin solution usually requires nothing but the addition of pigment and water to produce a ready to spray enamel. The resin characteristics are shown in Table I.

Table I
Characteristics of "Melaqua" 600

Solids % by weight	50
Solvent	Water
Color, Gardner 1933	7 max
Viscosity, Gardner-Holdt, 25°C.	Z4-Z6
Pounds per gallon, approx.	8.8
pH	9-10
Flash point	none

The resin solution tolerates infinite dilution with water and is unusually stable, showing no increase in viscosity after prolonged storage. It does not skin and is non-toxic. Although the solution has a color averaging about six on the Gardner scale it is non-staining, imparting no yellowness to white pigments and giving exceptional brightness of tone in colored enamels.

Enamel Formulation

"Melaqua" Resin 600 may be formulated into enamels by any conventional technique. The only critical behavior is a rapid reduc-

The authors are associated with the Plastics and Resins Division, American Cyanamid Co., New York, N. Y.

*Trade-Name of American Cyanamid Co.

tion in viscosity when thinned with water. As shown in Figure 1, a gradual reduction in viscosity occurs down to about 35% solids, but small additions of water thereafter give a rapid decrease. Between 30 and 25% solids the viscosity drops from eight to ten poises to 0.2-0.3 poises.

Pigments are readily dispersed by roller mills, or pebble or steel ball mills. Pigment wetting is generally excellent, although for maximum color development anionic or non-ionic wetting agents may be advantageous with certain pigments such as phthalocyanine blue. Frothing usually is not troublesome in fact, the resin solution shows practically no frothing tendencies except at solid concentrations below 27%. A silicone type antifoam suppresses foam at low solids levels.

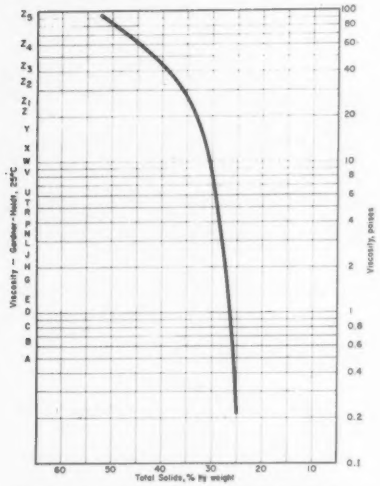


Figure 1. Viscosity reduction characteristics of Melaqua resin 600.

Driers, anti-skinning agents or other additives are not required. In white enamels a semi-chalk resistant grade of titanium dioxide gives satisfactory results. There appear to be no limitations in the type of pigmented enamels which are practicable with the water-soluble resin.

Interesting metalized effects can be made with aluminum powder combined with the various pigments. The appearance is pearly. The aluminum powder must be stabilized by a suitable technique before incorporation into the water system. Such a technique has been developed by Metals Disintegrating Company, Inc. It consists of allowing the powder to stand in

Table II
WHITE BAKING ENAMEL #483

Ingredients	Pounds	Gallons	% by weight of total formulation
UNITANE® OR 540 titanium dioxide	159.1	4.7	16.28
MELAQUA Resin 600	106.1	11.9	10.86
Grind 3 passes on 3 roller mill and add:			
MELAQUA Resin 600	292.5	32.9	29.93
Distilled water	419.6	50.5	42.93
	977.3	100.0	100.00

Per cent non-volatile	36.7	Pigment/binder:	
Viscosity, Ford Cup #4, seconds	45	In grind	300/100
Weight/gallon, pounds	9.8	In formula	80/100

Spray on steel, allow to dry 15 to 20 minutes.
Bake 30 minutes at 300°F.
NOTES: Avoid violent agitation before spraying.
Spray at full viscosity, atomizing pressure 70 to 75 pounds.

Table III
PHTHALOCYANINE BLUE BAKING ENAMEL #468

Ingredients	Pounds	Gallons	% by weight of total formulation
CYAN blue toner GT 55-3300[1]	32.0	2.3	3.64
UNITANE® OR-540 titanium dioxide[1]	10.6	0.3	1.20
MELAQUA* Resin 600	114.3	12.8	12.99
Distilled water[2]	120.0	14.5	13.63
Grind 24 hours in steel ball mill and add:			
MELAQUA Resin 600	313.4	35.2	35.61
Distilled water	289.8	34.9	32.93
	880.1	100.0	100.00

Per cent non-volatile	29.14	Pigment/binder:	
Viscosity, Ford Cup #4, seconds	60.0	In grind	75/100
Weight/gallon, pounds	8.8	In formula	20/100

Spray at full viscosity.
Bake 30 minutes at 300°F.
*Trademark
[1]American Cyanamid Company; Pigments Division.
[2]OR de-ionized water.

Table IV
METALLESCENT GOLD BAKING ENAMEL #476

Ingredients	Pounds	Gallons	% by weight of total formulation
(1) MELAQUA Resin 600	371.0	41.7	42.6
(2) Aluminum paste formula #474	23.3	2.2	2.68
(3) Distilled water	370.7	44.7	42.57
(4) Yellow iron oxide enamel #472	105.8	11.4	12.15
	870.8	100.0	100.00

Mix items (1) and (2). Then stir in (3) and (4) avoiding vigorous agitation.

Per cent non-volatile	26.2	Pigment/binder 7.8/92.2
Viscosity, Ford Cup #4, seconds	46	
Weight/gallon, pounds	8.7	

Application: Spray at full viscosity:
First coat—mist-air dry 2 minutes
Second coat—medium-air dry 2 minutes
Third coat—medium-air dry 2 minutes
Fourth coat—mist-air dry 2 minutes
Air dry 20 minutes before baking.
Bake 30 minutes at 300°F.

Table V

ALUMINUM PASTE #474 FOR MELAQUA RESIN 600 METALLESCENT ENAMELS[1]

Ingredients	Pounds	Gallons	% by weight of total formulation
(1) Distilled water	674.2	81.23	63.94
(2) Diammonium hydrogen phosphate	15.5	1.14	1.47
(3) Triton[2] X-100. Surfactant	1.6	0.18	0.15
(4) Aluminum powder MD 3100[3]	363.1	17.45	34.44
	1054.4	100.00	100.00

Dissolve (2) in (1), add (3), let stand 10 minutes and add (4).

Mix thoroughly and allow to stand 24-48 hours in loosely covered container before using.

Per cent non-volatile	34.4
Viscosity	thick paste
Weight/gallon, pounds	10.5

[1]NOTE: This aluminum paste is formulated according to a technique developed by Metals Disintegrating Company, Inc., Elizabeth, New Jersey. United States Patent No. 2,858,230 dated October 28, 1958 covers this development. Licensing information should be requested from Metals Disintegrating Company, Inc. before using this process commercially.

[2]Registered trademark, Rohm & Haas Co., Inc.

[3]Metals Disintegrating Co. (American Marietta Co.).

the presence of diammonium phosphate and a wetting agent. This process is described in U. S. Patent 2,858,230. Licensing information should be requested from the Metals Disintegrating Company before using their claimed process commercially.

Enamels are unusually stable showing no viscosity increase after storage as long as two years. Pigment settling is comparable to that encountered with alkyd-amino resin enamels and is readily redispersed by stirring with a spatula.

Typical enamel formulations are given in Tables II-IV

Enamel Application

Certain precautions are important. The enamels should be sprayed at a relatively high viscosity, usually within a range of 60-80 seconds Ford cup number four and seldom less than 45 seconds. Too low a spray viscosity can induce sagging and blistering.

A high atomizing pressure is advantageous, preferably about 75 psi. Vigorous agitation of the enamel should be avoided before spraying.

Optimum film thicknesses are 3-4 mils wet and 1.5 mils dry.

Because of the low evaporation rate of water, a hold out period before baking is essential. Generally this period will vary with film thickness. A hold out of 12 minutes will ensure a non-blistering film at 1.5 mils thickness under laboratory test conditions when the panel is introduced into the oven at a peak temperature of 300°F.

Considerable latitude in baking schedules is permissible although temperatures appreciably below 300°F. should be avoided. A schedule of 30 minutes at 300°F. gives satisfactory results, but shorter bakes at higher temperatures are practical. For example, white enamel number 483 (Table I) sprayed on aluminum sheet gives a hard, glossy and marproof film without discoloration when baked 30 seconds at 500°F.

The "Melaqua" 600 enamels show unusually good wetting of metal surfaces and even have been applied over imperfectly cleaned surfaces without cratering and crawling.

Although good results are obtained on unprimed surfaces, a primer is of course desirable for maximum performance. Good results have been obtained over an alkyd-amino resin primer. However, this is a solvent type primer whereas it has been reported that favorable results have been obtained over primers based on styrene-butadiene latex giving a completely solvent free finishing system.

Characteristics of Baked Finishes

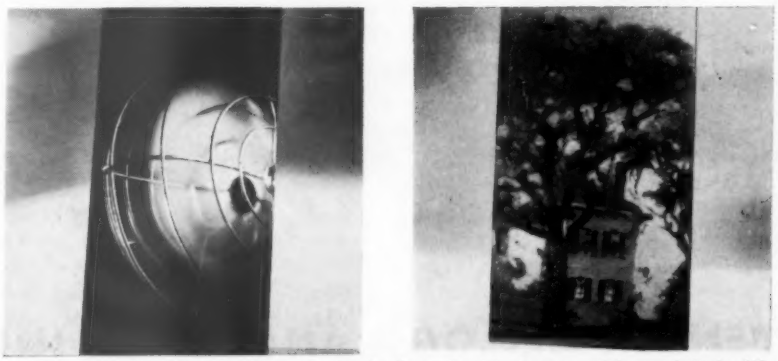
In regard to appearance, the outstanding properties of "Melaqua" 600 enamels are exceptionally good levelling and the clear sharp tones of pigmented finishes. Usually there is little or no orange peel effect and the wetting characteristics of the vehicle bring out maximum development of pigment color.

Gloss is generally comparable to that obtained with high melamine content solvent type enamels. White enamel number 483 shows a 60° gloss rating of 85 and ratings of 80-90 are obtained from colored enamels. Gloss retention is good during a ten minute overbake at 500°F.

The initial whiteness of a titanium dioxide finish is somewhat better than that of a typical white alkyd-amino finish and the resistance to yellowing on overbake is definitely superior. After ten minutes at 500°F. enamel number 483 showed a color change (increase in yellowness factor) of 0.08 whereas an enamel with comparable pigmentation and formulated with 30% melamine and 70% nonoxidizing alkyd showed a color change of 0.134.

In hardness and mar-proofness

(*Turn to page 81*)



For the purpose of illustrating the high gloss of a black enamel formulated with "Melaqual resin 600, note the reflection of the fan (left) and the oil painting (right) on the finished panel.

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By
Edward Anthony

The author expresses his random reflections on various aspects of the paint industry. The opinions contained in this column are his alone and do not necessarily reflect those of this publication.

TWO billion dollars is a lot of money, even today; this value of sales is one measure of the size of the coatings industry. In a comparative vein this is about seven per cent of the total sales of chemical products in this country. The growth rate of the chemical industry is such that each year it pyramids sales in an amount equivalent to our whole industry's portion. This is indeed impressive. It is axiomatic that this growth is dependent on the desire and need of consumers for the products of chemical plants. However, it is the continuous flow of new goods—including all of the ramifications of the definition of the word "new"—that is the spur for this purchasing.

Not all of the dollars nor all of the fine equipment poured into producing these products can account for the amazing progress we are witnessing. Rather, it is built on people—many different groups of persons. Not the least important contributors are those who may broadly be termed professional employees.

Probably there are about 5000 individuals employed by the paint industry who might properly have their jobs described as requiring intensive and extensive specialized training of an advanced nature; experienced judgment and discretion are requisites for the proper fulfillment of their duties. These professional employees are an important portion of the scientific endeavor which is assuming an increasingly important role in the community.

From the glass flasks of the research laboratory to the hundreds-of-feet-per-minute production lines, including the development laboratory's products of next month and the customer service laboratory's products of the moment, these are the men primarily responsible for the amazing coatings which protect and decorate so many of the objects which we use and with which we surround ourselves. Where else does one/one-thousandth of an inch do so much?

The Department of Labor predicts that during the '60s, the growth in employment of the professional and technical group will be double that of the whole work force (in "Manpower: Challenge of the 1960s"). The projected 40 per cent increase is by far the largest of any group and further emphasizes its importance. The standard of living is expected to rise 25 per cent, an increase which will be reflected in the necessity for 50 per cent more goods and services. Therefore our industry must strive for a compounded four per cent yearly growth rate merely to keep pace!

Of those receiving Bachelor's degrees this past year in chemistry and chemical engineering (from whose ranks we draw almost all of our technical employees), close to one-third will continue their education still further. Allowing for the numerous factors of attrition, some 150 of the new graduates should have been received into the paint industry (based on the seven per cent share of all chemical industry sales). Current starting salaries are about $500 per month for technically trained graduates—compared with 60 per cent of this amount ten years ago—a significant compounded five per cent increase per year, indicative of the increasing competition for such personnel.

This is certainly a good value to place upon the services of relatively untrained and unskilled employees, in the sense of the specifics of our, or almost any, industry. It is the fundamental knowledge coupled with future prospects which is being paid for. The disturbing impact of increasing starting salaries on the wage scale of experienced professionals has been discussed in various journals at length. This has put a heavy burden on attempts to maintain proper salary differentials. These initial salaries in part reflect the increasing demands for technically trained personnel by such "glamor" industries as electronics and by the new defense industries, such as missles, rockets, etc.

If competition is a main driving force of business, so is it in obtaining and keeping professional technical employees. Incentives must be provided for these employees who made the current growth possible, and upon who the future will be built. The National Society of Professional Engineers has reported that the median annual salary for all chemical engineers has climbed from $7,850 in 1952 to $10,000 in 1958 (*Chemical and Engineering News*, July 27, 1959). The is a compounded four per cent annual increment. This salary survey did note that increases for younger engineers during the previous year were more in line with those for experienced men, not greater as they have been in the past. It is important in evaluating the significance of these figures to note that numerous

salary analyses have indicated that chemical engineers usually are at the high end of the technological wage scale. Further, there were more respondents in the executive-administrative category than any other. It is therefore reasonable to assume that the average technical professional employee has not done as well as these figures indicate.

Vinyls — epoxies — polyesters — urethanes — silicones! These resin names are household words today. They did not spring full grown on to the market place. Developments such as these and others like the work-horse alkyds and phenolics, are the product of intensive hard work on the part of hundreds of individuals. Can one estimate the research, development and formulative effort that has catapulted water based paints to their present position? The pace cannot be slackened. Not only must new minds be continually recruited but the experienced people must be stimulated to their ultimate.

The climate for creativity has been widely discussed. For me, it remained for Ilka Chase, in one of her recent columns, to verbalize some thoughts I've had: "I don't happen to think that 'old pro' is a particularly felicitous phrase nor do I cotton to 'old girl' as a form of endearment but, do I appreciate an old pro on the job! The professional point of view I think may be defined as that held by those who respect their work and who put it ahead of their own convenience. I was about to say ahead of personal preferences, too, but the chances are that your true professional enjoys what he's doing. Aside from being his livelihood, it is the occupation he finds most rewarding." That hits home! Particularly for the worker in a paint laboratory!

As additional facts and figures can be gathered and put into perspective, more will be presented on the impact upon professional employees of salaries, incentives and other factors which influence career employment.

Test Methods

Rapid evaluation of a particular property by a simple testing procedure is a constantly sought-after goal. A new method is a simple machine devised to measure the printability of polyethylene. A report in *Paper, Film and Foil Converter* (April, 1960) describes it: "A small sample of film is clamped in a holder in horizontal position and a drop of distilled water is placed on it. An enclosed motor tilts the platform at the rate of one degree per second, the operator halting it when the droplet begins to flow. Degree of tilt is read on a scale at the end of the test. The angle is proportional to the forces of attraction between the drop of water and the film. These forces are further related to the degree of polarity. . .acceptable printability beginning. . .at about 30 degrees of tilt."

Such a device could possibly be adapted to the testing of finishes, for example, in the evaluation of waxes used to provide slip and slickness in baked enamels, paper coatings, etc., or as a measuring instrument to determine relative acceptance of a top coat by a primer, substituting a drop of an appropriate solvent for the water.

Another interesting testing procedure of an entirely different sort has just come to my attention, though the publication of the method was three years ago. "Rapid Detection of Urea- and Melamine-Formaldehyde, Isocyanate and Urethane Resins in Coatings" (by M. H. Swann, Coating and Chemical Laboratory, Aberdeen Proving Ground) is the descriptive title of a method of qualitatively determining the presence of these four nitrogen-containing coating vehicles. The following quotation from the Abstract summarizes the test: "The urea- and melamine-maldehyde resins in modified alkyds or other coating materials, can be identified simultaneously by refluxing with a mixture of acetic acid and anhydride containing a small amount of p-dimethylaminobenzaldehyde. A blue color develops in the digestion flask if urea resins are present, and an insoluble condensate forms in the air condenser if melamine resins are present. Both tests are very sensitive and the latter is strictly specific. Isocyanate and polyurethane resins are identified by the same reagent in glacial acetic acid with which they develop a yellow color at room temperature. This test is also specific."

This is a welcome addition to the growing number of qualitative identification tests available to our industry. Another, which is five years old but nonetheless deserves noting, is an addition to the many "spot" tests available for rapid determination of constituents of an unknown film. This test is for identifying the presence of technical poly(vinyl butyral); that is, there are also small quantities of poly(vinyl acetate) and poly(vinyl alcohol) present. After 30 seconds to one minute, a green coloration is obtained from a reagent consisting of acetic acid-acidified iodine/potassium iodide solution. This was reported in *Paint Manufacturing*, July, 1955.

Anyone for Carrot Oil?

The U. S. Dept. of Agriculture's Regional Utilization and Research Laboratories constantly strive, among numerous objectives, to find new applications for derivatives of domestic farm products. One of their interesting projects (recorded in the April 9, 1960 issue of *Chemical Week*) is aimed at less well known seed oils. Such prosaic crops as carrots, parsley, and even parsnips, yield petrosolinic acid oils, which are oxidizable to adipic acid, a nylon and polyester intermediate.

The common sunflower family is also not immune to oil extraction. Such desirable products as epoxy acids and an hydroxy, conjugated acid, may be squeezed from members of this family.

This work has so far hardly scratched the surface of this subject. And yet, with applicational research looking increasingly interesting, based as it is on such novel agricultural raw materials, one can look toward practical results in the future.

The article includes a number of facts which give one an idea of the diversity and size of the agricul tural world. For instance, there are about 300,000 plant species grown in the world, of which only 200-300 are grown commercially in this country. Of 188 seed samples examined so far in the course of this project, one-third contain at least 20 per cent oil!

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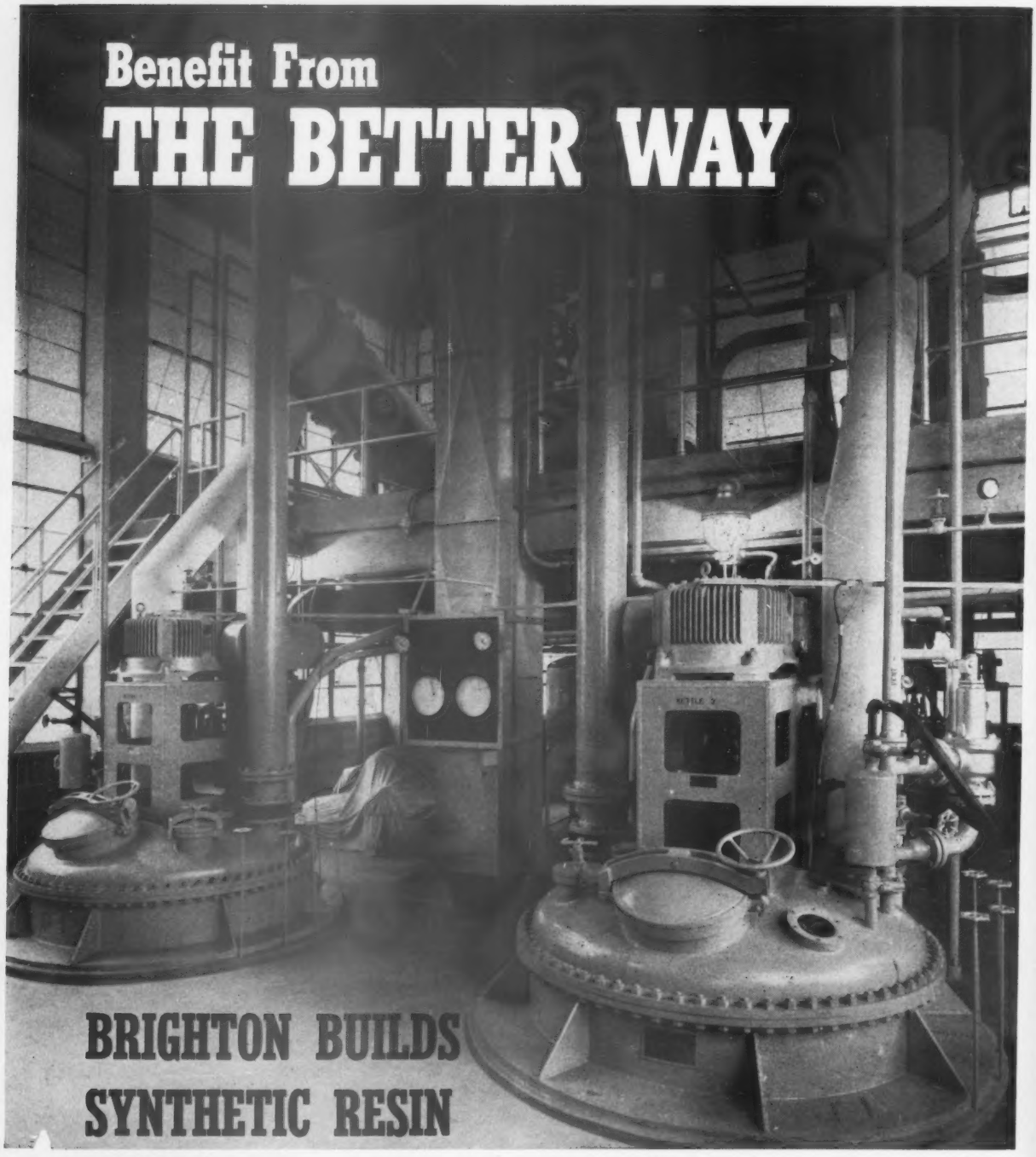

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SOME NOTES ON INNOVATION

A product in itself is insignificant—only its end use is important.

By

Lawrence Shatkin

I was fortunate in having attended a seminar on the Management of Innovation, which was conducted by the noted Peter F. Drucker, consultant, author, and professor at the Graduate School of Business of New York University. This subject was new and relatively unexplored. The persons attending had an advanced educational and business background with diversified interests. Cross discussion prevailed throughout the lectures.

Preliminary Statements

1. (a) A product in itself is insignificant—only its end use is important.

(b) Product improvement is not innovation.

(c) Real innovation is an entrepreneurial venture starting with no pre-conceptions or limitations.

2. Innovation can be the change in the mind and thinking of people.

3. Innovation embarks in a search for needs and then develops the solution.

4. The purpose of marketing research is to control and focus your risk, thereby permitting taking greater risks.

5. One of the real innovations was the Marshall Plan, whose aim was to help Europe rebuild itself. What was needed was the enthusiasm of the Americans. It was a new vision which focused on human resources rather than material resources.

6. Innovation deals with materials, designs, concepts and visions.

Criterions of Innovation

1. Timing and economic need.
2. Risk was generally agreed to

Innovation in material handling. Here a hiding tailgate facilitates motor truck deliveries in congested areas.

The opinions expressed in this feature are not necessarily those of any particular firm or organization.

Innovation is organized action. Thorough testing is important before a product can be marketed.

be a criterion of innovation, though it was agreed that many undertakings could involve risk without innovation.

3. Unhampered thinking and elimination of precedent are important requirements for fostering innovation.

Types of Development

There are many phases through which every new product passes before it gets into the hands of the ultimate consumer. These include ideation, evaluation, application, commercialization, production and distribution. They each play a role in anticipating and meeting changing market wants and needs. The character of these changes are either adaptation, innovation, or invention. Adaptation concerns building on precedent or to exploit variations on existing products for an established market. Innovation results from new concepts unhampered by precedent. It spans the entire field from policy planning to distribution. New characteristics of an item are developed for a market still to be determined. The potential of this market will depend on how well the product changes are translated into consumer uses and needs. Invention is linked with pure discovery, and at times has been used with the same intent as innovation.

Stimulants and Deterrents

1. A good starting point is within your company objectives.

2. There should be incentives for individuals to innovate (such as rewards), and checks to prevent excessive, unnecessary innovation.

3. Prompt communication, recognition of ideas, and discussion of them are important in creating an atmosphere for innovation.

4. Innovation leads to additional innovation.

5. Labor unions are often a deterrent to innovation because of their fear of lack of job security and general inertia involving changes instituted by management for improved efficiency.

The Self-Audit

The need for innovation can come either internally from a self-audit of certain factors, or externally from a study of the customers' needs or desires for certain products or services.

The factors to be examined in determining the internal need for innovation are as follows:

- Profit decrease
- Lack of growth in net assets
- Reduction in total company market
- Reduction in company's share of total market
- Inability to compete price-wise
- New products by competitors
- Identification of a limitation of resources—in people, equipment, finance, materials, production processes, etc.
- Reduction in productivity
- Inadequate management performance and development
- Inadequate worker performance and attitude
- Need for greater public responsibility
- Lack of innovation

A study of the above items must be part of a continuing, forward looking program. The self-audit to determine the need for internal innovation should also include a study of the company's objectives.

Planning for Innovation

1. In order to manage an innovation, you must be able to define the problem.

2. You must outline the prerequisites (human, technical, conceptual) and determine whether or not they exist. If the requirements do not exist, the researches have three alternatives: developing the necessary items, placing the project on follow-up pending development of the necessary prerequisites, or abandoning the project completely for lack of the prerequisites.

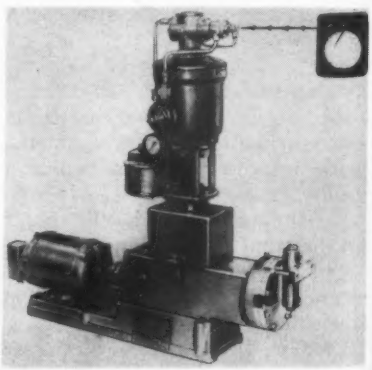
3. When planning innovation, do not play hunches—the improbable cannot be ruled out until they have been proven impossible. Organized innovation does not make decisions on the basis of probability.

4. A plan is not a rigid schedule, but a guide with which to check deviations.

Allocation of Efforts

The analysis of allocation of efforts for maximum economic results is a field not adequately exploited. A system should be established to handle the usual conditions, not the unusual. Efforts to make systems accommodate the unusual result in unnecessary, expensive complications. The concept of significant numbers can be applied to the economy of effort. The allocation of effort must represent a balance between the maximum results and optimum results that you can hope for at a reasonable cost. You have to think through what kind of an effort is required. Does the project require a large amount of mediocre work, or a small amount of high calibre work? This question is vital to assigning the proper personnel to the problem.

Innovation is a process of the business enterprise. It is an organized action, having an economic purpose, and bringing about economic performance. Innovation, to be effective, must be manageable, and be capable of being done by ordinary people. It is focused on applying new knowledge for purposeful ends, and implies a risk-taking experiment. The challenge before us is to take greater and better risks of innovation.



Innovation in production methods often requires unique equipment such as this pump which is electronically controlled.

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AUTO FLEET LEASING

in the

PAINT INDUSTRY

By

A. J. Schoenk*

How much auto fleet leasing is done in the paint and varnish industry?

At the end of July, 1959, there were 240,000 cars in leased auto fleets used by all industry. Of that number, about 8,000 are leased auto fleets used by paint, varnish and lacquer companies for their salesmen. Another 7,000 cars in the industry are company-owned, and still another 8,200 are owned by individual paint and varnish salesmen and used for company business.

In the paint and varnish industry, there are two major reasons why such firms as American Marietta Co. and others lease their car fleets. The first reason is the desire to preserve liquid working capital for use in the business. The typical paint, varnish and lacquer producer has a current ratio of 3.4-to-1. This would normally be more than adequate to carry on a business, except that this same typical manufacturer has fixed assets equal to one-third of his net worth, and inventory equal to two-thirds of his working capital. This means that every cent in the business is working overtime. As a result, holding on to liquid cash is a "must" for most paint companies. Leasing of company car fleets is one way in which this can be done. Using salesmen-owned cars is another way.

Second, paint and varnish companies have found that a leased fleet presents fewer headaches in supervision, operation and sale of used cars, than does a company fleet. In addition, depending on annual mileage and allowances, a leased car fleet is usually (but not always) cheaper to operate than salesman-owned cars, and more efficient.

What types of autos are leased?

All types. Most leased auto fleets are low-priced cars for salesmen, higher priced for executives. Some companies lease station wagons. There is no restriction as to make, model or optional equipment.

Why has auto fleet leasing grown so rapidly?

Auto fleet leasing came into the picture before World War II. Giant companies found that they could use their own capital to better advantage in production, so instead of buying their auto fleets, they leased them. After the war, medium-sized and smaller companies found the same advantage to be true. What precisely is this advantage?

If a company buys an auto fleet costing $100,000, it takes this money out of its working capital. If this company earns profit on its working capital, for example, at the rate of 20 per cent *before taxes*, then the company would be sacrificing these profits by freezing the capital in fixed assets like an auto fleet. However, by *leasing* its fleet instead of buying, and leaving its working capital in the business, this company would be far ahead in net profits *after taxes* at the end of the lease period.

Companies can estimate the cost of using their own capital for purchasing a fleet, by examining the rate of profit they earn on their working capital in their own businesses. This differs from company to company. In the paint, varnish and lacquer manufacturing industry, for example, the average *before tax* net profit on net working capital is 20 per cent—before Uncle Sam takes his slice. In other words, the "cost" of purchasing a fleet with a paint company's own capital would be (on the average) 20 per cent of the amount invested in autos per year.

On a $100,000 fleet, that "cost" would be $20,000 the first year, less (because of depreciation) the second year. That $20,000 is the amount of net profit (*before taxes*) which a paint company would forego if it pulled $100,000 out of current operations and froze the cash in fixed assets. This sum is part of the true cost of company-owned auto fleet operation.

*Wheels, Inc., Chicago 45, Ill.

If you compare earnings of two paint companies of the same size and sales volume—one company using a leased fleet of (say) 100 cars on two-year lease, the other using a company-owned fleet of 100 cars—the company with a leased fleet would be about $50,000 ahead of the second company using a company-owned fleet. This $50,000 would be cumulative *after tax* earnings at the end of two years. (An objective analysis of the different methods of fleet acquisition has been developed by the Foundation for Management Research. It is entitled: "Advantages and Disadvantages of Auto Fleet Leasing: A Comparison of Company Ownership, Salesman Ownership, and Leasing." Single free copies may be obtained by writing to the Foundation at 121 West Adams Street, Chicago 3, Illinois.)

How does auto fleet leasing work?

There are two basic types of auto fleet leasing plans: the Finance (Equipment Trust) Lease and the Maintenance (Fixed-Cost) Lease.

The Finance Lease: In this plan, Wheels, Inc., for example, provides the auto fleet at special low fleet prices, delivers them to the salesmen in their home territories, and sells the fleet at the end of the (normally, two-year) lease period. For these services, the leasing company charges a monthly leasing fee. To this is added a monthly payment (2% of original cost) covering depreciation. All costs of maintenance are borne by the user. In short, the Finance Lease gives the user a brand-new fleet of cars, and handles the sale of the used cars. Everything else is provided by the user.

However, one of the intangible but strong benefits of this plan is the guidance of the leasing company as to the best type of cars to use for a particular company's business, and the best time of the year to dispose of the used cars. Where the leasing company is a large national concern with years of experience, it can dispose of used fleets in different used car markets throughout the country. At any given day, prices for a given model may be higher in one city than another. A national leasing company keeps abreast of such price situations in order to get the best prices for its clients' used car fleets.

The Maintenance Lease: In this plan, the leasing company not only provides the new fleet, but takes over the whole expense of fleet operations, except for daily gas and oil costs. This includes buying the fleet, delivering it to salesmen in their home territories, all repairs and maintenance work, insurance, licenses, taxes, tires, and selling the fleet. The leasing company also bears all risks of depreciation. For this whole package the leasing company charges a flat monthly fee covering everything—fleet acquisition, maintenance, depreciation, etc. The user has a fixed cost and knows exactly what his fleet operating costs will be. The user is out of the automobile business.

What are the advantages of auto fleet leasing?

In addition to conserving a company's working capital, auto fleet leasing offers these advantages:

A. Leasing an auto fleet is a form of financing which does not affect a company's ability to borrow from its normal sources. If a company borrowed to buy an auto fleet, such borrowing would appear as a liability, and affect the company's remaining credit. A leased fleet, however, is not a liability, nor does it affect a company's borrowing power any more than does annual rent for a building.

B. Leasing frees company executives from supervising an auto fleet and enables them to devote their full time to the company's main business.

C. In most situations a leased auto fleet is more economical than other forms of operation.

D. Companies using a Maintenance (Fixed-Cost) Lease can budget transportation costs for 12 or 24 months in advance.

E. A leased car is often an important fringe benefit to offer a company's salesmen or to attract good new salesmen. It eliminates a morale problem where salesmen object to using their own cars on company business.

F. Through leasing, a company's salesmen have latest model cars, well-maintained, which enhance the company's prestige and give its sales force the best transportation available.

G. Autos are delivered directly to salesmen in their home territories and picked up from them at trade-in-time. Salesmen do not lose days trading in their cars.

When is leasing NOT advantageous to a company?

(A) A company which has more short-term and long-term capital than it can profitably use in its direct business operations, will not find leasing advantageous. After all, why pay a leasing company for use of capital, if the user has spare capital of his own? Occasionally, even such a company will go in for leasing merely because leasing relieves company executives of the administrative burdens of buying and selling cars, and possibly fleet management. The company may find that by leasing, lower prices on new cars and higher prices on used cars may be secured. But if these latter considerations are of no importance, or if the user can accomplish those ends by other means, and if working capital is no problem, there is no point to leasing.

(B) A company which pays its salesmen by commission only—without direct reimbursement for the use of their cars—will not find leasing advantageous. However, it is a mistake to think that since the salesman pays for the car out of his pocket, that the company has none of the burden. True, the company does not have to lay out capital to buy a salesman car, but the company does have to pay a commission broad enough to cover cost of car operation. The fact that some companies attempt to pay less than the cost, explains the high labor turnover among their salesmen. This increases salesmen training costs. If this is insignificant, the company should stick to salesmen-owned cars.

(C) Companies whose salesmen average 1,000 miles per month or less in auto travel, primarily in cities,

find it advantageous to reimburse their salesmen on a cents-per-mile basis—but only if the rate is under 10 cents, and the company is indifferent to what the salesmen's cars look like. Where this latter is unimportant and the total cost to the company is under 10c per mile, such companies should continue to use salesmen's cars. The Foundation report, mentioned earlier, has some interesting tables on this.

How does leasing compare with company ownership of auto fleets?

Company-owned auto fleets have been declining since the end of World War II. On the average, only 25 per cent of autos used by industry are in company-owned fleets. In terms of cost, data for most company-owned fleets show an *apparent* lower cost (per mile) than for leased fleets. This is misleading, since companies conveniently overlook the cost of their own capital invested in their own fleets. The cost of capital *is* included in charges made by a leasing company.

As has been pointed out under Question 3, companies can estimate the cost of using their own capital for purchasing a fleet, by examining the rate of profit they earn on their working capital in their own businesses. This is what they must pay for use of company capital if they use this working capital and sink it into an auto fleet.

There is no mystery about this. It is this realization which is partly responsible for the steady decline of company-owned auto fleets, and the continuous growth of leased fleets.

How does leasing compare with salesman-ownership of auto fleets?

Many of the companies using salesmen-owned fleets are smaller companies. Salesman-ownership of cars eliminates any company investment in a fleet, which is similar to the advantage offered by leasing.

Most of these salesmen are reimbursed for the use of their cars on a cents-per-mile basis. In the paint and varnish industry the national average for such payments is 8.76 cents per mile and salesmen average 25,000 miles per year. Except for low-mileage fleets, leasing is normally less expensive.

While saving of company capital is important, salesmen-owned cars have some serious drawbacks. For one thing, if company mileage payment is 7c a mile, a salesman-owned car driven more than 23,000 miles a year is more expensive to operate than using a leased car. At 8c a mile, a salesman's car driven over 18,000 miles a year is uneconomical for any company; a leased car is cheaper. At 9 c a mile, anything over 17,000 miles is too expensive; leasing is cheaper.

Many companies with salesmen-owned cars have switched to leased auto fleets because it cut mileage costs. However, companies with low annual mileage per salesman (under 15,000 miles) should show lower mileage costs than under leasing, provided the mileage allowance is under 10c.

Of course, there are intangible drawbacks involved in using salesmen-owned cars, which cannot be evaluated in dollars and cents, but which have been considered important by different companies. For example, no matter how generous the mileage payments, the salesman tends to look upon mileage payments as regular income rather than as cost of operating his car. He doesn't consider that he must lay aside some part of those payments as depreciation cost, to be used in purchasing a new car. As a result, he resents the burden of getting a new car, which poses a morale problem and creates disloyalty.

Making ownership of a late model car a prerequisite for employment, limits companies in their choice of good sales personnel. Such companies have to hire only salesmen who own late model cars and are willing to use them on company business. On the other hand, using only salesmen-owned cars does have the advantage of taking a company out of the automobile business, though it undermines company control of such matters as insurance, looks of the car, down-time for repairs and trade-ins. Where salesmen have been offered a choice between driving their own cars with mileage payments, or using a leased or company-owned car, the vast majority of salesmen have elected not to use their own autos.

What are recent trends in auto fleet leasing?

The most recent trend in auto fleet leasing in the Finance (Equipment Trust) Lease, described earlier. This conserves a company's working capital while enabling the company to take advantage of any lower operating costs that may be peculiar to its fleet operation under its own fleet manager.

What is the length of auto lease terms?

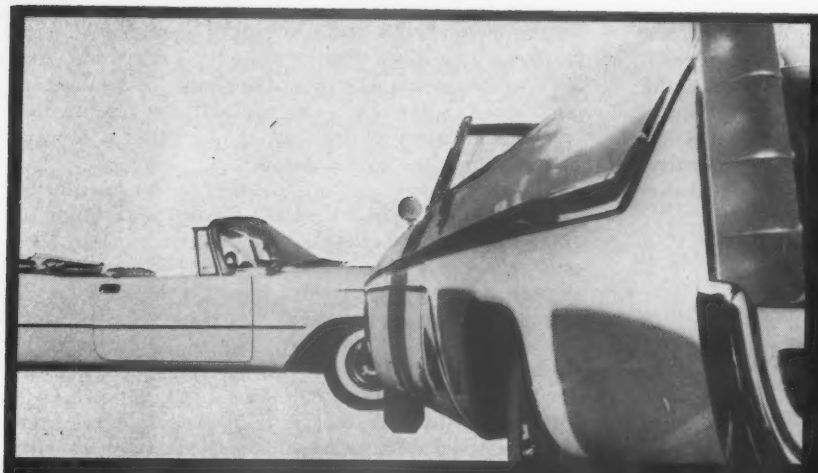
Finance Lease terms are generally for two years or more, except where companies have extremely high mileage (50,000 miles per year, for example). The one-year lease is rapidly disappearing because of the high depreciation factor in the first 12 months of an auto's life. Maintenance Leases are often for two years, though some are shorter.

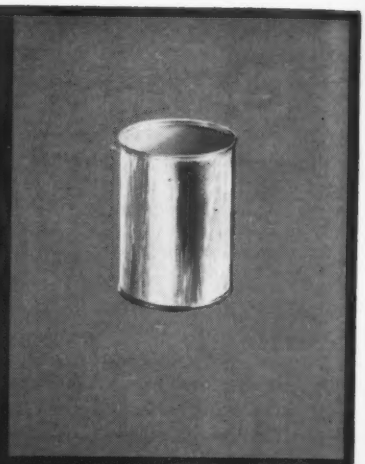
What happens to the autos when the lease term is ended?

They are sold as used cars by the Leasing company. In the Maintenance (or Fixed-Cost) Lease, the used car price is of no importance to the lessee because the depreciation has already been covered in the fixed rental payment per month. But in the Finance Lease, the used car price is of extreme importance, since the final cost of the fleet operation will depend on how well the leasing company can dispose of the fleet. Where the selling price is high enough, the user does not have to make up any deficit on depreciation cost. An experienced, national leasing company which sells its fleets throughout the nation, can take advantage of the best going markets to dispose of fleets at highest prices. Most clients of such companies do not have to make up any deficiencies if they follow the leasing company's advice on when to sell their used cars.

How can I tell if my company should lease its auto fleet?

Each company must examine its own particular situation. If a company can use outside capital in the form of a leased auto fleet and keep its own capital working in the business at a better return, then it pays to lease. To determine this, companies should examine their own returns on net working capital before making a decision. Similarly, if a company is using a salesman-owned fleet, it should examine whether or not this is more costly than leasing and whether salesmen's morale and transportation efficiency could be improved through leasing.





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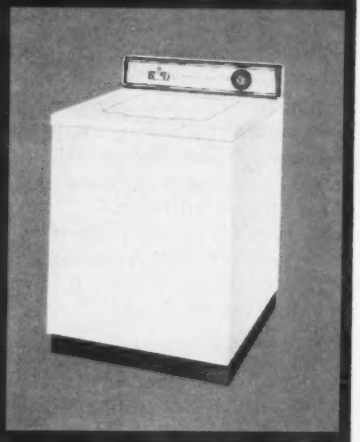

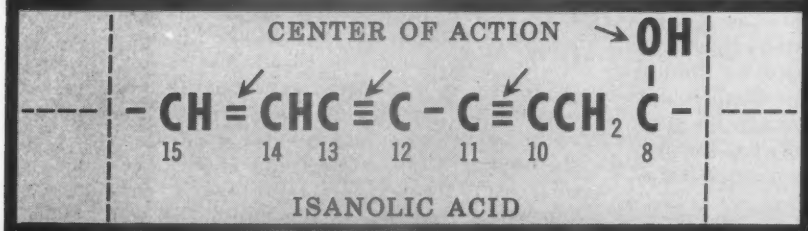

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New Developments

U. S. Steel Announces Lighter Tin Plate Development

Details of a new "lighter, thinner" tin plate were recently disclosed by United States Steel Corp.

Developed by U. S. Steel at its research center and plants, the process permits production of tin plate about half the thickness of anything now used in can making.

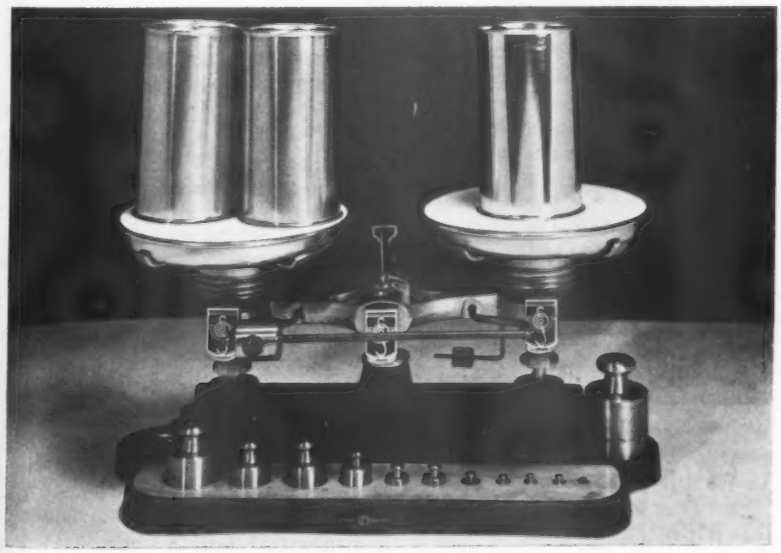
U. S. Steel is seeking patent protection on the new method. Meanwhile, can manufacturers are experimenting with the thinner tin plate to determine where it can be used to best advantage.

The company's new tin plate is a completely different product. The new process produces tin plate in weights ranging from 40 to 60 pounds per base box. Most tin plate now used by can producers is in the 75 to 100-pound base box weight range.

The new product has additional strength and rigidity, according to Robert B. Meneilly, General Manager of Tin Mill Products for U. S. Steel. These qualities may be helpful in maintaining the high speed production of modern can manufacturing and for obtaining the desired rigidity in the finished container.

Mr. Meneilly stated that facilities are now in the experimental stage. He said U. S. Steel is probing the market, determining the potential for the lighter tin plate. A prediction of when the new product will become fully available will depend on further research and development by both U. S. Steel and can manufacturers. Ultimately, customer acceptance will determine how fast the new tin plate is brought to market.

"From the work we have done thus far," he said, "we believe the lighter tin plate to be an economically sound product for can manufacture. It has very high potentials in many areas. Among them are cans for frozen concentrates, quart oil cans, and other general line and sanitary-type cans."



Cans made with new tin plate cut weight almost in half.

Polytung Oil Developed

Polytung Oil is made in specially designed stainless steel equipment at temperatures in excess of 600° F. under high pressure. Polymerization is accomplished without dilution and eliminates the gas checking and cheesy dry associated with raw Tung Oil.

Typical Analysis

COLOR—Gardner 1933	7/9
VISCOSITY (Gardner @ 25° C)	Z_1/Z_2
ACID NUMBER	6/8
IODINE NUMBER	115/125
SAPONIFICATION NUMBER	170/176
% SOLIDS	100
Weight per gallon	8.0 Pounds

Polytung has a high solubility factor and is compatible with a broad range of resins and synthetics. It lends itself particularly well as a fortifying plasticizer for vinyls, Vinsol*, chlorinated rubber (Parlon*), alkyd resin, and cellulose coatings. In latex emulsion and alkyd flat paints it increases adhesion and flexibility.

As a plasticizer, Polytung Oil remains open and free of skin for more than 24 hours under heat of 200°F in an open dish. In a chlorinated rubber base system this prohibits the powerful solvents—necessarily used in a system of this type—from lifting the undercoat on a two coat application.

On the other hand, addition of .05% cobalt and .3% lead makes Polytung a rich, firm, high lustre drying oil which will set to touch in 3 to 5 hours and dry overnight without gas checking to a water and chemical resistant film having excellent durability.

Heavier viscosities are rapidly and easily obtained by heating Polytung Oil at 425/450°F. This property will allow simple and safe increase in viscosity in a hot melt system where it is more feasible to melt resins in a kettle for varnish production.

New Plasticizer Announced

Plasticizer # 7, an amber, mixed alcohol phthalate with good efficiency and solvating properties, coupled with superior tolerance for secondaries, good low temperature properties, and resistance to oil, water, and soapy water extraction, is available from Mercury Chemical Corp. Edison, N. J.

PTSA

(*para*–toluenesulfonamide)

new, cheaper way to make non-blotching mildew-resistant paints and coatings

One of the paint maker's (and professional painter's) nightmares is the appearance of dark brown or black blotches on a relatively new paint job. Almost as bad is the onset of a generally dingy look. Often when this happens the irate homeowner or maintenance man blames either the painter or "cheap paint." But, the real culprit is usually: mildew!

The AMERICAN PAINT AND WALLPAPER DEALER (Vol. 46, 1954) reported from a survey covering hundreds of house exteriors that mildew is the major cause of painted-surface disfiguration; 68% of the homes observed were marred by stains and blotches that had nothing to do with dirt or paint failure!

Paint makers recognize the problem, but most have been discouraged by the cost of making their paints immune to mildew attack. Until recently, the cost of a fungistatic additive ran about 50¢ per gallon of paint. Now a new fungistat, paratoluenesulfonamide, promises to cut this cost by at least one half!

Structurally, PTSA is distantly related to sulfanilamide, but as a volume-produced intermediate it is quite low in cost. Nonetheless, PTSA is a "wonder drug" in its own right as far as making paint and varnish films immune to mold stain and to decay by microorganism attack.

Paint makers first got wind of this low-cost way to make fungus-resistant paints from a report: "Tropical Performance of Fungicidal Coatings," Part I, by J. M. Leonard and A. L. Pitman, of the Naval Research Laboratories. According to the NRL report, PTSA gave excellent mildew protection to the varnishes used for electronic equipment in jungle service. Subsequent studies showed that PTSA was equally effective in a variety of protective coatings. Among these, tested in the steamy jungles of Panama, were white house paint, barn paint, lacquers and tung-oil varnishes!

The NRL work started years ago when it became apparent that fungitoxic varnishes were badly needed for coating electronic equipment used in the moist, humid areas of the South Pacific. Primary function of the varnish was to impede moisture adsorption and to create a nonwetting surface of high electrical resistance. Out of 100 promising chemical compounds, the six best fungistats chosen for extensive evaluation were: PTSA, salicylanilide, phenylmercuric phthalate, pentachlorophenol, uranyl nitrate, and copper 8-quinolinolate. PTSA proved to be the best, either alone or in binary mixture.

In the initial testing, the vehicle was a phenolic resin and tung-oil varnish containing about 12.5 gallons of oil per 100 pounds of resin, closely resembling the coating prescribed by Specification MIL-C-173. The PTSA was simply added by grinding in on the ball mill. Samples of this varnish with various concentrations of PTSA were applied to cotton braid and exposed at tropical Coco Solo Panama Canal Zone temperatures. As little as 2% PTSA (on the nonvolatile) controlled mold attack even after 33 months of exposure. By this time the unprotected controls had virtually rotted away.

Subsequent test results with barn paints, white house (mill white) paints, iron oxide-linseed oil types, gloss alkyd enamels, lacquers and others confirmed that PTSA gave outstanding protection against mildew attack on all coatings subject to attack. The amount of PTSA needed varied with the particular formulation, and for each formulation there appeared to be a critical minimum level. For clear varnishes the required amount of PTSA was in the range of 2-4%; for paints, in the range of 6-8% or higher.

PTSA has several "pluses" for paint makers: it is an easily handled fine white crystal, compatible with coating vehicles and virtually non-toxic. It has no effect on pigmentation. Water-base paint makers, eyeing the possibilities of water-base exterior alkyds, are particularly interested. The reason is simple; some water-base paints are susceptible to mold and mildew attack before use. Some mold in the can! *Industrial and Engineering Chemistry* magazine (April 1959) estimates a half-million dollars was spent in 1958 for preservation of water-base paints alone. PTSA offers protection both in-the-can and after application. To the water-base paint maker, PTSA promises he can kill the two birds with one stone.

For futher information on paratoluenesulfonamide use in mildew-resistant paints and coatings, request a copy of Specialty Data Report CS-12. Write to: Monsanto Chemical Company, Organic Chemicals Division, Dept. 2770-F, St. Louis 66, Mo.

Surface coating improvements possible with New Dimer Acids

Dimer acid, already widely used in the surface coating industry, now has even greater potential with the introduction by Emery Industries of two new commercial grades, Empol 1014 and Empol 1024. Like the present standard commercial grade, Empol 1022, they are a mixture of dimer acid (C_{36} aliphatic dicarboxylic acid), trimer acid (C_{54} aliphatic tricarboxylic acid), and C_{18} monobasic acids.

New Low-Monobasic Grade

Empol 1024 is a low-monobasic acid (1% max.) version of Empol 1022 (approx. 75% dimer, 22% trimer, 3% monobasic). The less than 1% monobasic acid content of Empol 1024 is a valuable characteristic in resins where minimum chain-stopping is required.

High Dimer Grade

Empol 1014 offers considerable flexibility in formulation with its 95% dimer acid content (the balance is 4% trimer, 1% monobasic acids). Compounding with Empol 1022 or 1024 permits considerable variation in the dibasic-tribasic ratio to obtain optimum results for any specific coating formulation.

Advantages of Dimers

Because dimer acid can be used as both the dibasic acid constituent or the fatty modifier, it is unique in the surface coating industry. It has been used as a modifying agent in alkyds, varnishes and bodied oils. Essentially a pre-polymerized fatty acid, it shortens kettle time and increases through-dry. Replacement of part of the phthalic or maleic anhydride increases flexibility and toughness. The 75:22:3 composition of Empol 1022 is excellent for these applications. The 22% trimer acid provides sufficient cross-linking, but still allows the incorporation of a sufficient amount of Empol 1022 before gellation occurs.

Polymer Applications

For formulations where 3% monobasic provides excessive chain-stopping, Emery offers Empol 1024. This contains 75% dimer for linearity, 24% trimer for cross-linking, and less than 1% chain-stopping monomer. For linear polymers, Emery's Empol 1014 with 95% dimer performs essentially like a long-chain member of the adipic-azelaic-sebacic family. Also, it increases the amount of dimer that can be incorporated in resins before gellation occurs.

Emery also has a 75% trimer under development for surface coating uses that require extensive cross-linking for flexibility and toughness. Drum quantities can be delivered with reasonable notice.

Price Reduction

The price of Empol 1022 was recently lowered to 25¼¢ per pound. Prices for the new dimers delivered in tankcar lots east of the Rockies are 26¢ per pound for Empol 1024 and 35¢ for Empol 1014 (a reduction of 10¢ per pound from its development tag).

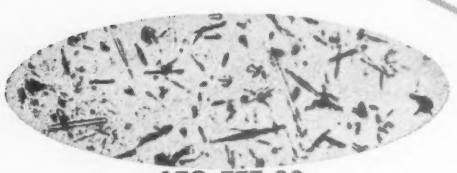
Further information on these dimers is available from Emery. Request Technical Bulletin No. 418 covering the new acids or Emeryfacts "Empol 1022 Dimer Acid" from Emery Industries, Dept. X-7 Carew Tower, Cincinnati 2, Ohio.

Emery

High Apparent Density, De-aerated

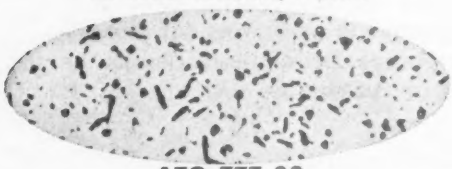
AZODOX

Available in all AZO paint grades of American Process zinc oxides.



AZO ZZZ-22
for high consistency in paints

AZO ZZZ-11
for medium consistency in paints



AZO ZZZ-33
. . for low consistency in paints

AZO acicular zinc oxides are free from detrimental colloidal fines, produce exceptional weathering properties in exterior paints, and are resistant to hard settling during shelf storage. For general use in the production of paints and enamels.

1ST

American Zinc was the first, *and is still the only* producer of acicular lead-free zinc oxides covering a wide range of oil absorptions from high to low *and including the intermediate ranges.*

AZODOX has twice the apparent density, half the dry bulk. Cuts storage space in half. Except for density, all physical properties are unchanged. And all chemical properties are unaltered. AZODOX saves you money in handling, storing, mixing, grinding. Costs no more than conventional zinc oxides.

AZO acicular zinc oxides (AZODOX or conventional) are recommended for the extra durability, the finer weathering qualities they give to paint. Available in a wide range of oil absorptions to meet your requirements.

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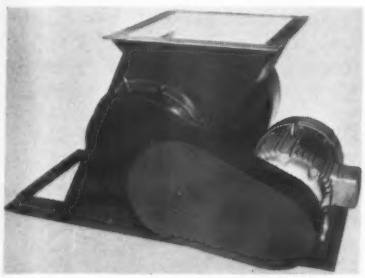
NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



MILLER

CHOPPING DE-LUMPER
Low RPM

New stainless steel, heavy duty chopping de-lumper No. 1075B, chops and de-lumps with minimum fines, low rpm, low temperature rises: rosin, resins, anhydrides, waxes, shellac, varnish, and other heat sensitive or semi-tacky materials.

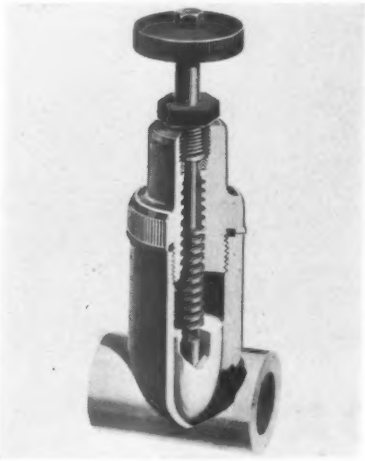
The chopping and de-lumping mechanism consists of a slowly revolving toothed single roll on which a large number of replaceable, non-swinging teeth are fastened. Many types and sizes of teeth are available including pick, hatchet, hammer, and anti-clog types. Teeth pass through a stationary sizing comb furnished in many styles to suit the material.

Reduction and de-lumping takes place as one after the other of the pick-like teeth come in contact with the material. This occurs rapidly in succession in a staggered manner to rock the chunks and prevent jamming. Tooth angle is such that chunks of any size up to full hopper dimension are chopped. Feed is automatic as teeth grab chunks of all sizes and force them against the size limiting comb for final reduction.

Final reduction and sizing takes place as teeth trap over-sized pieces against the rugged comb. Desired size particles are pulled through the comb and discharged downward by centrifugal force. The single toothed roll does the entire action, resulting in a chopping de-lumper which is simple, positive acting and durable.

Machine takes up to 16″ feed in 16″ x 16″ opening. Product choice: ¼″ to 4″. Weight of machine 1200 lbs., 5 to 10 h.p. motor. Larger units are available in steel, carbon steel and cast iron.

Franklin P. Miller & Son, Inc. Dept. PVP, 36 Meadow St., East Orange 13, N. J.



VANTON

GATE VALVES
High Strength

New polypropylene throttlable gate valves are light in weight, have high strength and chemical resistance. They possess excellent resistance to most solvents, greases, oils and the majority of common acids at temperatures up to 185°F.

The polypropylene throttlable gate valves are available from stock in sizes from ½″ to 2″ with socket-weld, flanged or screwed ends and combine the features of straight through no pressure drop flow with close throttling control which places them amongst the most versatile plastic valve products now available.

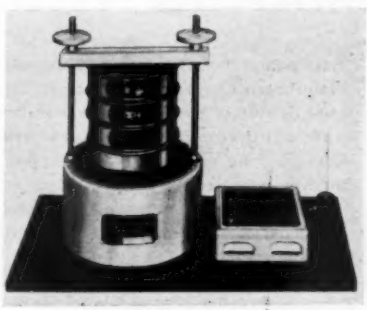
Vanton Pump & Equipment Corp., Dept. PVP, Hillside, N. J.

SCREENING UNIT
Quiet Operation

New CDP 8-in. circular screening unit, designed for research laboratory, production-control labs, and pilot-plant use, features unusually quiet operation. In addition, it is readily carried by one man, weighing only about half as much as comparable competitive units.

The CDP screening unit features a unique vertical-horizontal pulsating action that assures fast, fine screening. The pulsating action is provided by two independently driven rotating shafts operated at adjustable speed differentials. Each motor is rheostat controlled so the pulsating action can be readily adjusted for different materials. The Wettlaufer-developed pulsating action screens most materials almost instantaneously and keeps the screen cloths clean.

When used with standard sieves and pans without spouts, the CDP 8-in. screening unit provides rapid analysis of measured batch samples. When equipped with



BARTLETT & SNOW

sieves fitted with spouts, the unit is useful in production control for analysis of larger samples by continuous operation—or for continu-

ous screening and recovery of valuable materials.

This unit is ideally suited for screening granular, crystalline, powdery, or other dry materials, even through 200, 325, and 400 mesh. In addition, it gives excellent results screening slurries and fluids, such as paint, syrup, etc. Even when operated continuously, there is no blinding (clogging of the screens).

There is no vibration in the base, so the unit can be set on any table or bench. Motor operates on DC or 25, 50, or 60-cycle AC current. The unit is also available in 12 and 18-in. sizes.

The C. O. Bartlett & Snow Co., Dept. PVP, 6200 Harvard Ave., Cleveland 5, Ohio.

SURFACE COATING RESIN
Formulation Latitude

A new surface coating resin of extraordinary versatility has been developed. The company's plastics and resins division is now making available commercially CYZAC 1016, a new product formulated for use with alkyds to provide exceptional impact resistance, hardness and mar-resistance to baked enamels while permitting them to retain a high degree of flexibility.

Besides this unusual combination of features, CYZAC 1016 is also 1½ times more effective than melamine resins in alkyd/amino systems. This permits paint manufacturers greater latitude in formulation, hence more economical use of materials since one pound of CYZAC 1016 can replace 1½ pounds of melamine resin. The low viscosity of CYZAC 1016 has little effect on the final viscosity of the finished enamel.

The product is currently manufactured at Bridgeville, Pennsylvania. The unit of sale is tank car and tank truck, carload or truckload in drums, as well as less-than-carload drums and five gallon pails.

American Cyanamid Co., Plastics and Resins Div., Dept. PVP, 30 Rockefeller Plaza, New York 20, N. Y.

DIMER ACID
Two New Grades

Full commercial status of two new grades of dimer acid is announced.

Empol 1024, is similar to the current standard commercial grade of dimer acid, Empol 1022. However, it contains less than 1% monobasic acid (1022 has 2-5%), making it more suitable for polymer uses.

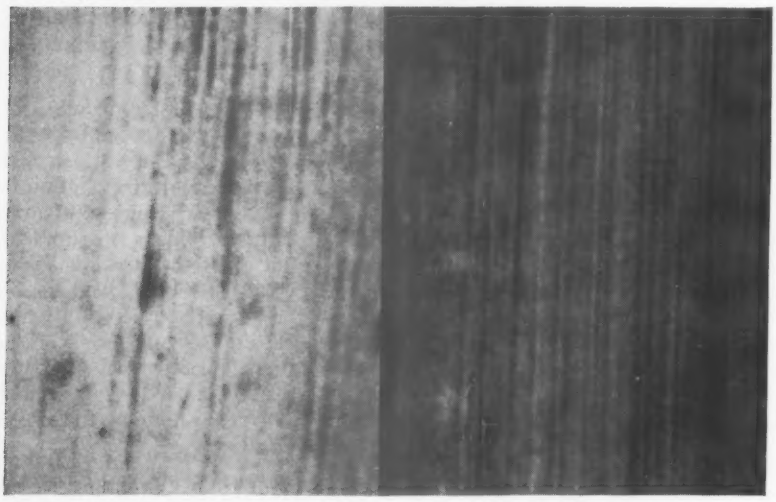
Empol 1014, is a 95% dimer acid also containing less than 1% monobasic acid. Full commercial availability of the new grades of dimer permits users to select optimum composition for specific uses.

Present markets for dimer acid include rust inhibitors, surface coatings, urethane foams, polyamide and polyester resins, lubricating compounds, waterproofing agents, and surface active agents, among others.

Empol 1024 was developed to meet the need of a dimer acid with an extremely low monobasic acid content for urethane foams. Its 1% maximum monobasic acid content makes it suitable for all such polymeric end-products, in which as much as 5% monobasic acids may interfere with desired properties.

Empol 1014 is the first pure dimer acid offered commercially. It extends the use of dimer acid to all applications which could not tolerate the high proportion of trimer acid present in Empol 1022 and 1024. Long dimer polymer chains can now beformed with

In any area...in exterior house paints



Magnification: IX

ZINC OXIDE
MAKES THE DIFFERENCE

These panels have weathered three years on southern exposure in Chicago. The panel at left is coated with a standard house paint containing adequate zinc oxide . . . the other with a commercial zinc-free exterior paint. The latter surface is very badly eroded and offers no protection. The zinc-containing paint is still tight and sound.

The desirable resistance to erosion of paints formulated with zinc oxide are well known. But proper zinc oxide concentrations do much more:

Paints containing adequate ZnO resist staining by soluble dyes . . . withstand the destructive effects of ultraviolet light . . . resist mildew and spore growth . . . have better control of chalking. In short, ZnO lengthens the life, improves the service and appearance of any good paint.

For further information, write American Zinc Institute.

AZI **AMERICAN ZINC INSTITUTE, INC.**
292 Madison Avenue, New York 17, N. Y.

little cross-linking. For example, in alkyd resins, where dimer acid is incorporated as a replacement for the fatty modifier and a portion of the dibasic acid to improve through-dry, toughness, and flexibility, appreciably more Empol 1014 can be used than Empol 1022 before gellation occurs.

Emery Industries, Inc., Dept. PVP, Carew Tower, Cincinnati 2, Ohio.

FILTER SHEETS
Acid Treated

New filter sheets are available in ten standard grades to cover the range of millimicron particle retention. Specially formulated grades are also available for particular or unique applications. The range in particle size retention varies from 2 or 3 microns down to particle sizes so infinitesimal as to be difficult or impossible to analyze. A specific example of difficult or impossible particle size analysis would be in Pyrogens.

Filter sheets are manufactured under rigid standards to insure a constant quality of filtration and capacity. The filter sheets are acid treated and are constantly tested in our laboratory to meet our standards of low leachable calcium and iron content. As a double check, filter sheets are periodically analyzed by a reputable independent analytical laboratory.

Ertel Engineering Corp., Dept. PVP, Kingston, N. Y.

ELEVATING TRUCKS
All-Welded Steel Frame

New line of battery-powered portable elevating trucks that provide up to 33 per cent more load and load length capacity has been introduced.

The line includes 24 models, tripling the number of battery-powered units the company made formerly.

Twelve of the new models are rated for lifting 1500-pound loads that are up to 32-inches in length. The other 12 feature 2000-pound load capacities and 24-inch load lengths. Previously, the firm's largest elevating truck was equipped to handle a 1500-pound load capacity up to 24-inches in length.

In addition to offering greater flexibility to the user in handling more bulky and heavier loads, the new units are available at a nominal extra charge of $100 for the 1500-pound capacity models and $135 for the 2000-pound capacity trucks.

Design changes incorporated into the new trucks provide more heavily constructed forks and heavier hydraulic cylinders. An all-welded steel frame, with alloyed steel construction in the lifting channels, gives the unit excellent durability under strenuous operating conditions, according to the manufacturer.

Safety features include dual floor brakes with 12-in. braking area, plus a built-in lowering valve in the hydraulic system which eliminates the danger of sudden or rapid lowering of a load. Two heavy-duty roller leaf type chains on dual sheaves support the fork carriage.

A hydraulic drive attachment for moving 1500-pound capacity trucks is also available. Tradenamed "Load Jockey," the unit is powered by an hydraulic pump and when attached will drive a fully-loaded truck at 1¾ m.p.h.—a comfortable walking speed. It adds only 10½ in. to overall length of the truck and is equipped with important safety devices, including a control that automatical-

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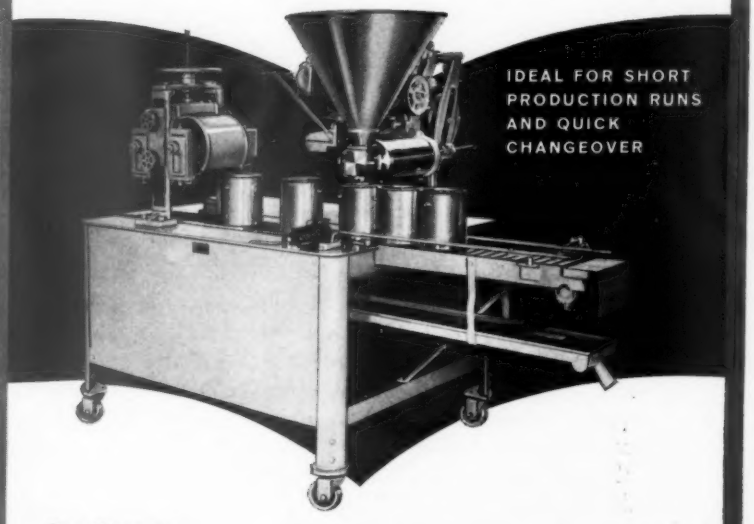

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ly stops the truck if the operator removes his hand from it; and an automatic reversal, which enables the operator to quickly shift the truck into reverse if he should become trapped between the unit and an obstruction. A wheel guard, an optional feature that stops the truck if the guard strikes the operator's foot or other obstruction, also may be obtained.

The company offers as optional equipment on all trucks 240 amp.-hrs., 12 volt, heavy duty, industrial batteries, as well as heavy duty industrial chargers which double the operating life of the battery.

American Pulley Co., Dept. PVP, 4200 Wissahickon Ave., Philadelphia 29, Pa.

WATER DISPERSED DRIERS
Pre-dispersed

Driers are designed specifically for use in all latex and pigment dispersion systems. These ready-to-use products contain finely divided metal naphthenates in water, are pre-dispersed so that only simple mixing is required for thorough incorporation with the finished paint at any stage of manufacture. Previously available latex driers have been dispersible, but not *pre-dispersed*. The size of the emulsified drier particles is the same as the size of the particles of latex, and remain in suspension.

Meletex driers are available in the following metals: Cobalt 5%, Lead 20%, and Manganese 5%. U. S. patents are pending.

Harshaw Chemical Co., Dept. PVP, 1945 E. 97th St., Cleveland 6, Ohio.

MIXERS
3600-8000 RPM

A complete line of highly versatile mixers for the laboratory and for production, is now available.

The models range from ¼ hp to 15 hp sizes, ranging in mixing capacities from 3 gallons to 3000 gallons. Each model may be converted in seconds from closed turbine to open turbine mixer, or vice versa, providing a dual application mixer in a single unit.

The mixers mix, blend, disperse and homogenize materials of any viscosity which can be pumped or forced through the mixing head of the mixer. At shaft speeds of up to 8000 rpm for the laboratory models and 3600 rpm for the production units, the rotors create tremendous forces of shear and impact as the material being processed is forced between the rotor and stator as it moves through the mixing head.

The distance between the rotor and the stator can be readily changed to decrease or increase the degree of shear and impact to which the material is subjected in the mixing head. Excessively viscous, gelatinous or highly thixotropic materials can be readily processed by removing the stator sleeve and operating the unit as an open turbine mixer.

The mixers are designed to draw the material being processed from below and to force it upward through the restricted jet openings of the mixing head without forming a vortex.

Barrington Industries, Inc., Dept. PVP, 185 Union Ave., Providence, R. I.

ULTRA-FINE ASBESTINE® 425 IMPROVES OIL OR EMULSION SEMI-GLOSS SYSTEMS

Asbestine 425, International Talc's ultra-fine fibrous magnesium silicate pigment, is tailored to give a Hegeman grind of 5 to 5½ without milling. This stir-in talc is especially recommended for industrial applications and high-quality semi-gloss finishes where small particle size, fineness of grind and ease of grinding are important. Its fine particles, equivalent to 625 mesh, are free of hard to disperse flocculates.

Asbestine 425 greatly assists dispersion of tinctorial pigments. It is easy to incorporate in oil, resin or water emulsion paints and enamels. In these systems, its excellent color, normal vehicle demand and ease of dispersion can be translated into savings in raw material and manufacturing costs.

Write for samples and further data on Asbestine 425. No obligation, of course.

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PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Drying Oil

U. S. Patent 2,933,538. Augustus Bailey Small, Baton Rouge, La. assignor to Esso Research and Engineering Co., a corporation of Delaware.

A process for preparing oily polymers which comprises polymerizing a cyclic diene compound selected from the group consisting of cyclopentadiene and alkyl substituted cyclopentadienes, by contacting said cyclic diene with a solution of aluminum bromide in an alkyl halide solvent at a temperature between —24°C. and +20°C. said aluminum bromide being present in an amount between 5 and 15% of the cyclic diene compound.

Apparatus For Pouring Varnish

U. S. Patent 2,935,424. Bernhard Glaus, St. Gallen, Switzerland, assignor to Ulrich Steinemann Aktiengesellschaft, St. Gallen-Winkeln, Switz.

A method of discharging varnish from a varnish discharging vessel simultaneously upon two surfaces of a workpiece that are inclined relative to each other, which includes the step of feeding said workpiece underneath said varnish discharging vessel with said inclined surfaces inclined in the direction of feed of said workpiece and with said inclined surfaces when underneath said vessel so located that each of said inclined surfaces forms an angle of substantially the same magnitude with the flow of varnish from said vessel upon said inclined surfaces while each of said angles forms an image of the other, and maintaining said inclined surfaces at said angle while varnish flows from said vessel over said inclined surfaces.

Nitrocellulose Lacquers

U. S. Patent 2,935,414. Ralph L. Cook, Alton, Ill., and Eugene A. Andrew, Berkeley, Mo., assignors to Olin Mathison Chemical Corp., East Alton, Ill., a Corp. of Va.

A method of preparing a nitrocellulose lacquer which comprises adding water wet fibrous nitrocellulose to an agitated water immiscible solvent until the solvent-to-nitrocellulose weight ratio is about 1.5:1 to effect the separation and stratification of a continuous water phase, and decanting the continuous water phase from the lacquer.

Flame Retardant Composition

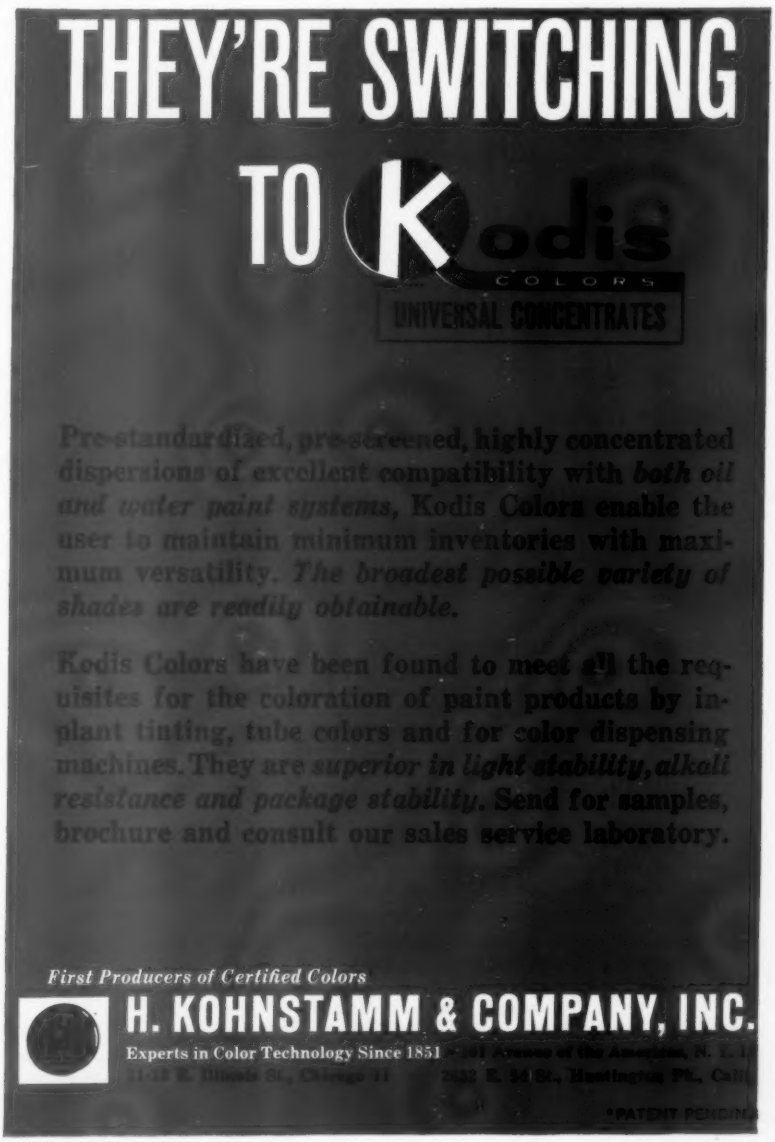
U. S. Patent 2,935,471. Ralph Aarons, Wilmington, Del., William H. Baumgartner, Chadds Ford, Pa., & Daniel R. English, Middletown, N. J., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del., a Corp. of Del.

A composition useful as a flame retardant comprising 60 to 90% by weight of at least one compound selected from the group consisting of ammonium sulfamate, ammonium sulfate, diammonium monohydrogen phosphate and monoammonium dihydrogen phosphate, 5 to 20% by weight of a weakly basic, nitrogenous, water-soluble compound, and 5 to 20% by weight of a water-soluble boron compound selected from the group consisting of boric acid and an alkali metal borate, said alkali metal borate having an alkali metal to boron atomic ratio of from about 1/3 to 1/2

Process for Applying a Protective Coating to a Magnesium Surface

U. S. Patent 2,935,423. William H. Kapfer, Hastings on Hudson, and Max Kronstein, N. Y., N. Y., assignors by mesne assignments, to the U. S. of America as represented by the Secretary of the Navy.

A process for applying a protective coating to a magnesium surface said process comprising the steps of cleansing said surface; contacting the surface with an aqueous solution having an elevated temperature and consisting essentially of 50-95 parts by weight of sodium pyrophosphate, 1-5 parts by weight of sodium fluoride, and 4-40 parts by weight of a metallic salt selected from the group consisting of cadmium sulfate, copper sulfate, chromium sulfate, nickel sulfate, cadmium cyanide, chromic nitrate, and aluminum nitrate; rinsing the surface; drying the said surface in the air; im-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mersing the said surface in a 5-40% by weight aqueous solution having an elevated temperature of one from the group consisting of iron phosphate, ammonium vanadite, and sodium dichromate; and rinsing the surface so that the coated surface exhibits a high degree of uniformity and stability.

Enamel Paint and Method of Producing a Surface Covering Resembling a Tiled Surface

U. S. Patent 2,935,417. John Biskup, Mountain Lakes, Spencer Johnson, Chatham and Paul C. Wetteau, Pompton Plains, N. J., a Corp. of N. Y.

A method for producing a surface covering resembling a tiled surface having tiles and depressed narrow strips therebetween representing mortar lines which comprises coating a fibrous web of material with a film of thixotropic oleoresinous paint in the color of the tile, allowing the paint to set to a non-flowable condition without drying and printing on the set paint the narrow strips with an enamel comprising a mixture of oleoresinous binder, pigment and an oil with drying properties which has been heat bodied to a high viscosity and then treated with a basic substance capable of reacting with the free acid portions of the heat-bodied oil, said high viscosity being less than that at which gelation of the oil occurs.

Mold Coating Composition

U. S. Patent 2,932,576. Ernest R. Vierk, Lansing and Charles A. Mozzoni, Jr., Harvey, Ill., assignors to Sinclair Refining Co., New York, N. Y., a corporation of Maine.

An emulsifiable oil composition consisting essentially of about 1 to 40 percent by weight of graphite electrically suspended in a neutral petroleum oil, about 1 to 15 percent by weight of a non-ionic surface active polyoxyalkylene derivative of hexitol anhydride partial long chain fatty acid ester containing about 2 to 25 mols of ethylene oxide per mol of ester, about 0.1 to 2 percent by weight of a non-ionic surface active long chain fatty acid partial ester of hexitol anhydride, about 0.1 to 5 percent by weight of a non-ionic surface active fatty acid ester of polyethylene glycol wherein the fatty acid portion of each of said esters contains about 12 to 18 carbon atoms per molecule, with substantially the remainder being a petroleum oil of lubricating viscosity.

Method of Removing Organic Surface Coatings

U. S. Patent 2,937,111. Gene L. Leithauser, Oak Park, Mich., assignor to General Motors Corp., Detroit, Mich., a Corp., of Del.

In a method of removing synthetic resin protective coatings the steps of immersing the work in a solution comprising by weight about 93.0 to 98.0 parts of a material selected from the group consisting of phenol and cresol, about 1.5 to 5.0 parts of orthophosphoric acid (85% solution by weight) and about 0.5 to 2.0 parts of a wetting agent, retaining the work in said solution for a time sufficient to loosen said coating, and removing said work.

Coating Composition of Methyl Methacrylate Polymer

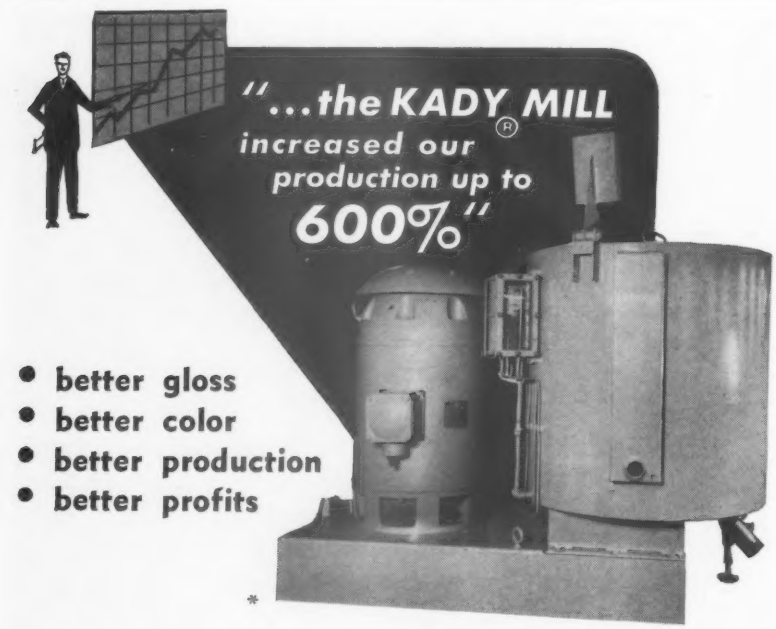
U. S. Patent 2,934,512. Henry W. Godshclk, Swarthmore, Pa., assignor to E. I. du Pont de Nemours and Co., Wilmington, Del., a corporation of Delaware.

A non-gelling liquid coating composition which on drying yields a durable non-tarnishing film, comprising a polymer of methyl methacrylate having a molecular weight of 55,000-105,000 solvent therefor, transparent colored pigment, and 0.5-35% of copper bronze flake pigment, based on the total weight of the non-volatile components.

Radiochemical Treatment of Drying Oils

U. S. Patent 2,936,275. Isidor Kirshenbaum, Union, Anthony H. Gleason, Westfield and Vincent L. Hughes, Clark Township, Union County, N. J., assignors to Esso Research and Engineering Co., a Corp. of Del.

A method for bodying a polybutadiene drying oil, said oil having an oxygen content of about 9 wt. percent and a viscosity of about 3.0 poises at 50% non-volatile matter as measured in xylene at 77° F. which comprises subjecting said polybutadiene in admixture with lead naphthenate in an amount equivalent to about 1 wt. percent lead to gamma radiation for a total dosage of 1 to 80 megaroentgens.



A New Jersey producer of industrial coatings, who bought a KADY dispersion MILL six years ago writes us: "The KADY MILL is in continuous daily use and has become the most important single equipment unit in our production set up. It has increased our production up to 600% over other dispersion equipment." Dispersion jobs that normally take 24 hours can be accomplished in 15 MINUTES with a KADY due to its exclusive kinetic dispersion principle.

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TECHNICAL Bulletins

FATTY ACIDS

Tall oil fatty acids, one of the most inexpensive pure materials available to the chemist today, are used in protective coatings, soaps, plastics and in increasing number of other products. Uses and properties of tall oil fatty acids are discussed in a new bulletin "Fatty Acids from Tall Oil."

In the past ten years tall oil fatty acids production has grown from insignificance to the largest commercial source of unsaturated fatty acids in the United States (about 5 million pounds in 1950 to about 150 million pounds in 1959). The next ten years will see this production increase to 240 million pounds in 1965 and 275 million pounds in 1970 based on current estimates.

Fractionation capacity to produce tall oil fatty acids from whole (crude) tall oil will increase to over one billion pounds whole tall oil input in 1960-61 according to the information published in the book. This capacity for fractionation can utilize all the crude tall oil produced as a by-product of the pine sulphate pulp industry in the United States today.

A survey of the utilization of fatty acids indicates 29.1% is used in protective coatings, 21.7% in soaps, detergents and disinfectants, 23.2% in intermediate chemicals with smaller amounts in flotation and mineral recovery, driers, hard floor coverings and miscellaneous uses. Many new uses are being found for this inexpensive and adaptable product.

Pulp Chemicals Assn., Dept. PVP, 60 East 42nd St., New York 17, N. Y.

HEXAHYDROPHTHALIC ANHYDRIDE

A 17-page booklet describing the characteristics and suggested uses for hexahydrophthalic anhydride is now available.

The new brochure, I-2R, lists chemical and physical properties and the strength of hexahydrophthalic anhydride, and its physiological hazards and handling procedures.

Hexahydrophthalic anhydride is used in the manufacture of alkyd resins, coatings, adhesives, resins, insecticides and as a synthetic lubricant for diffusion pumps.

Allied Chemical's National Aniline Div., 40 Rector St., New York 6, N. Y.

ACRYLONITRILE

A 16-page booklet describing the properties, uses, handling and testing of acrylonitrile has been published.

A special chart showing the extensive reactions and derivatives resulting from organic syntheses of acrylonitrile is included as part of the report. The chart is divided into cyanoethylation, nitrile and olefinic reactions and lists the broad range of potential uses for acrylonitrile derivatives.

Other sections of the booklet are devoted to the proper storage and handling of acrylonitrile and its end-use applications.

The booklet also highlights results of ultraviolet spectroscopic quality control tests and discusses other analytical techniques employed by the firm to ensure uniform high quality and purity of its acrylonitrile.

Company first produced acrylonitrile in 1952 at Texas City, Tex. Since then, repeated expansions in production capacity have made the company the world's largest sup-

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Samples and technical bulletin available on request.

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plier of the versatile chemical. Major use for acrylonitrile is as an intermediate in the manufacture of such products as synthetic fiber- and synthetic rubber, plastic molds ing materials, adhesives and surface coatings.

Monsanto Chemical Co., Plastics Div., Dept. PVP, Springfield 2, Mass.

EXTERIOR LATEX PAINTS

The results of a comprehensive study into the performance of extender pigments in exterior latex paints are presented in a new bulletin. The report details the effect of aluminum silicate, calicate, calcium carbonate, magnesium carbonate, and calcium metasilicate extenders at various loadings in white, red, green and yellow paints formulated from acrylic, polyvinyl acetate, terpolymer and styrene-butadiene latex emulsions.

Viscosity, pH and settling characteristics as a measure of package stability are discussed. Detailed results are reported in tabular form. Exterior exposure performance evaluations are presented tabularly and graphically using A.S.T.M. Federation of Production Clubs ratings. Characteristics covered include general appearance, chalking, dirt collection, color retention and fading. Based on the results of the study seven recommended formulations are given.

Minerals & Chemicals Corp. of America, Dept. PVP, Essex Turnpike, Menlo Park, N. J.

GRAVITY FILLER

Bulletin is available on new gravity filler. According to the firm, the filler will fill cans, plastic bottles and other standard containers; will fill all containers up to 1 gal. capacity, with minimum 7/16″ neck openings; will not collapse or distort containers; is superior for filling foaming liquids.

Ertel Engineering Corp., Dept. PVP, Kingston, N. Y.

WET GROUND MICA

Recent research indicates that the addition of platy mica especially in its highly purified water ground form, in 325 mesh size has a very beneficial effect on acrylic latex exterior house paints. The studies measured such properties as water sealing, gloss retention, discoloration and light transmission through the applied paint film.

The results of the research are described in detail in technical bulletin No. 41, *The Influence of Wet Ground Mica on Acrylic Latex Exterior House Paints.*

The technical bulletins reporting continuous research since 1949, are issued as a service to the paint industry. They are available on request from the Wet Ground Mica Assn., Inc., Dept. PVP, 420 Lexington Ave., New York 17, N. Y.

CORN PROTEINS

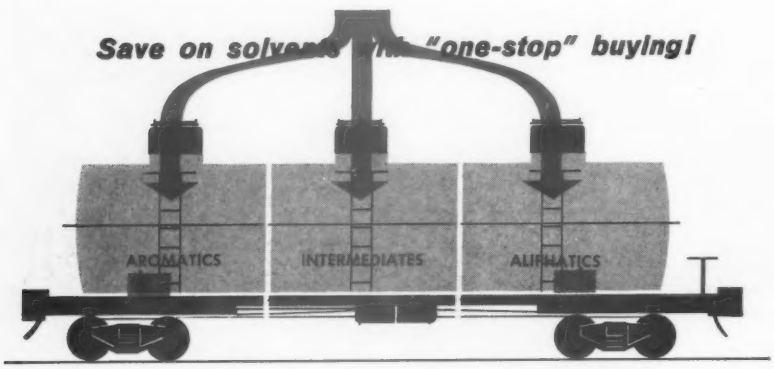
New 40-page booklet describes "Argo Brand Zeins G-200 & G-210.

The two-color booklet describes numerous uses for both the alcohol-soluble protein, Zein G-200, and the new mild aqueous alkali dispersible protein, Zein G-210.

Present and projected used for Zein corn proteins for pharmaceutical, food, and paper coatings, paints, inks, varnishes, cork seals, floor finishes, fusion resions, and release coatings are described in detail. Film forming, binding, and adhesive characteristics are also discussed.

Shipping information, available literature, properties of solvents and diluents, and resin sources are also included.

The Corn Products Division, Corn Products Sales Co., Dept. PVP, 9 East 55 St., New York 22, N. Y.



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How the "magic touch of aerosol packaging" can work "sales magic" for you!

In just two years, aerosol paints have shown a phenomenal 158% increase in sales! And these record-breaking sales are just a drop in the paint bucket compared to potential!

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At home, "do-it-yourselfers" find aerosol paints for small jobs are neater, easier to apply, do the job faster. Last year, these advantages helped sell a total of 67.9 million cans valued at $90.6 millions*. . . a spectacular increase over the $76.4 millions in sales for 1958! And the potential sales market for standard aerosol house paints is estimated at 267 million units per year! Also, there's a fast expanding market for acrylic resins and lacquers . . . and specialty coatings such as multi-color, speckled-type paints.

How General Chemical Can Help You

As a leading producer of aerosol propellants, General Chemical has developed extensive market information on present and anticipated aerosol paint sales. We will also direct you to highly capable contract fillers, who can put up small runs for you or handle full-scale commercial production. These contract fillers will work with you from planning and testing through to volume filling. They can get you into the aerosol coating market quickly and efficiently—*without any outlay on your part for plant, special equipment or personnel!*

For further information—or to arrange a special presentation on the aerosol coating market—write today to "Genetron," General Chemical Division, Allied Chemical Corporation.

*Estimated by Market Surveys Dept., General Chemical Division, Allied Chemical Corporation

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He pushes your order for push-button products

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At Capitol's new modern plant three new stainless steel filling lines are at your service. Orders as small as 150 cans of touch-up paint can be handled on one line, while another turns out 100,000 cans. The firm can now load more than 25 million push-button packages a year, and handles most any type of push-button product—from household cleaners and protective coatings to shaving cream. Separate facilities are available for solvent and water-based materials and complete laboratory and research facilities are maintained for customers.

Whether you're looking for fast aerosol packaging service on your present products or are planning a new line, a contract packager can help you many ways. He can advise you on the market and can help reformulate your product. He recommends the proper can, valve and propellent for you. More likely than not, he'll specify Pennsalt ISOTRON®—the extra-pure, extra-dry propellents that are factory-sealed for your protection.

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AEROSOL COATINGS

PACKAGING

FORMULATION

PRODUCTION

George Fiero (left), president of the Chemical Specialties Manufac turers Association, receives a gold-plated aerosol can from Roger F Hepenstal, president of the Can Manufacturers Institute as a high light of the recent CSMA convention in Chicago. Award was mad "on the occasion of the Sesquicentennial of the metal can, and ir recognition of the contribution by the chemical specialties industry."

Self-spray paint troubles stop here

This is part of Sprayon's quality-control laboratory, where six full-time chemists and paint technicians make sure that your aerosol finishes—custom-loaded by Sprayon—never vary in color or performance. Before production begins, even on a routine re-order, prototype cans are made up in the laboratory and given an accelerated aging test equal to a year of shelf life. Test panels are then sprayed and the film is analyzed by precision instruments. Gloss and other characteristics are checked. Color is double-checked under a MacBeth light, the accepted standard of the paint industry. The spray pattern and the mechanical efficiency of the container are checked. All test data, materials and samples are dated, coded and filed for a year for later reference. Sprayon quality control is one reason why Sprayon has handled the greatest possible variety of contract-loading assignments for many of the nation's largest manufacturers—year after year after year. Get the full Sprayon story today.

SPRAYON PRODUCTS, INC. 2084 E. 65th St., Cleveland 3, Ohio

Contract Filling

VS

YOUR OWN

By
E. G. Roberts

THERE is no more vital or controversial question in the aerosol industry than that which a marketer or potential marketer asks, "Should I fill my own products?". Conversely the contract filler or loader is asking, "How can I maintain operations or technological expansion with the constant threat of my customers setting up their own lines".

As with many such business problems there is no set or pat answers. Each marketer must answer according to his own needs and each filler must resolve the threat to his best interest.

Each year has seen a 20 to 30% increase in total aerosol production but also has resulted in a larger and larger share of the filling being done by the marketers themselves. Yet the casualties among aerosol fillers have if anything been less than in other industries.

Loaders Dominate

The aerosol industry was founded some 12 or 13 years ago by a few entrepreneurs, adventurous souls who set up production lines often designed and built by themselves for the general business of contract or custom filling. For the first two or three years in the late forties, with one or two exceptions, the contract loaders dominated the the industry. Some even marketed their own brands but early found that in so doing they were at a disadvantage in competing for the business of other marketers. Much of the early years, as now, was spent by the fillers endeavoring to convince the marketers that they should adopt the new method of pressure packaging.

Aerosol paints were some what anomalous in that their growth was fostered by companies who entered the new aerosol filling field and established brand names for aerosol paints on a national scale. It has only been in the past several years that the "old line" marketers of paints have placed their own brand of aerosols on their shelves. Until recently the attitude of the large manufacturer has been, "How much paint can you sell at $25 per gallon?." The growth of aerosol paints has given the answer, "Quite a bit.", though aerosols are still relatively only a small part of the total volume of paints.

About 1950 the large marketers of chemical specialties household, and toilet products began setting up their own filling lines. There are no figures available today for the relative volume filled by the marketers themselves and the custom loaders. However, few will dispute that the amount is fairly well divided between the two types of operations. That is, of the 575 million non-food aerosols filled in 1959 the marketers themselves account for about 50%, give or take 5 or 10%.

The fillers' share of the industry varies considerably from product to product. With shaving lather by far the greater percentage is filled by the marketer on his lines. With colognes in glass perhaps the reverse is true. Other products fall closer to the 50% average.

It is also a well established industry practice that most large marketers with their own lines contract out a good proportion of their small runs, new products or overflow from their peak production.

Using Contract Loader

In favor of the contract loaders are many hard economic facts:

(1) New products can be introduced by marketers with no capital investment in equipment, no warehousing, only the sales effort. The filler does all the production.

(2) Specialized technical and production personnel of the fillers is instantly available to the marketer.

(3) Fuller use of production lines by the contract loader.

(4) Volume purchasing of valves, containers and supplies by the loader.

(5) Readily expandible production facilities among the contract loaders permits the marketer to adjust his production needs with sales.

(6) The time lag in a marketer getting on the market with a new product can be diminished by using a loaders facilities.

Your Own Filling

In favor of the marketer "doing it himself" are also converse vital factors:

(1) Elimination of another profit factor, the contract loader. Many companies as a matter of policy much prefer to control their filling operations.

(2) Better quality control and efficiency in production from beginning to end. Products vary in the problems of manufacturing the "concentrate" at one point and filling at another. Some fillers to overcome this have set up production facilities in their own plants such as for soaps and paints.

(3) Better production planning and inventorying in having the complete operation under their own control.

(4) Though their own personnel must be trained in aerosol technology eventually they are better off with these men in their own organization.

These are legitimate reasons for both the marketer and the filler being in the aerosol business and maybe the present split, roughly a fifty-fifty distribution of production facilities is for the best.

However no one can deny that the competition between fillers for their share of the market has resulted in some evil practices by both the filler and the marketer.

Foremost among these has been the temptation for some fillers to cut prices, quality and services unduly to take business from other fillers or to prevent their customers from setting up their own lines.

On the other hand, some marketers have much abused the privilege and opportunity of having the loaders do their product development for them. One has seen several fillers frantically developing new products for the same single marketer. If the marketer finally selected one formulation it would not be so bad but quite often after much time consuming activity he abandons all marketing plans because they were lightly and poorly conceived. Similarly, the rushing of a new product by both filler and marketer before it is fully tested and evaluated is bad.

Each marketer must fully evaluate the pros and cons of having his own production facilities. Any effort to set an industry pattern, one million, five million yearly production above which a company should set up his own lines is not sufficient judgement. Each company must weigh the merits of both systems according to his own peculiar requirements.

As long as the aerosol industry continues to expand, the threat of the marketer filling his own should not be too hard for the efficient contract filler to live with.

Certainly the fillers have been the backbone of the industry. We owe its development and growth to their enterprise. All segments, the aerosol suppliers, marketers and above all the contract fillers themselves should endeavor to keep the institution of contract filling in a healthy state.

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CSMA Survey Shows—

AEROSOL PAINT PRODUCTION SOARS

First successful survey reports 1959 volume well over 56 million units.

AEROSOL production figures for 1959, released at the Chicago May meeting of the Chemical Specialties Manufacturers Association, mark the continued growth of the industry.

Adjusted production for all non-food aerosols, in the United States and Canada, was indicated to be 575,000,000 units in 1959. Aerosol coatings of all types and sizes were approximately 56½ million containers. This report, the 9th Annual of the CSMA Products Survey Committee, was the most successful to date, in that 87% of the estimated total production was tabulated in the confidential questionnaires returned.

The actual units of paints reported are given in Table I.

It was the opinion of the Survey Committee that the total production of coatings was 4 million units higher than the above figures. This gives an aerosol paint production in 1959 of 56,555,836 containers.

The basis of the adjusted quantity is a comparison of the total units reported by the 115 companies answering the questionnaire and the valve and container production in 1959.

The comparative reported figures follow:

Aerosol Products filled; 498,287, 943
(115 companies reporting)
Aerosol Valves produced: 603,988,202
(9 companies reporting)
Aerosol Containers
(Glass & Metal produced: 583,993,378
(7 companies reporting)

On the basis of the valve and container information the Survey Committee adjusted the total figures to compensate for non-reporting fillers and concluded that the total number of non-food aerosols produced in the United States and Canada was 575,000,000. This represents, a 22% growth over 1958.

Last year's survey (the 1958 figures) was much critized for the poor response from the fillers, particularly for coatings. Fortunately, this years survey included the production of several major paint aerosol loaders who did not participate in the former tabulation. For this reason a direct comparison of the 1959 coating production with the approximate 30,000,000 reported for 1958 is not valid. These latter figures for the previous year are admittedly too low.

Because of last years poor response the committee went all out to insure the success of the current survey. Personal solicitation of both fillers and marketers was necessary to obtain the fullest possible cooperation of the industry.

The method used to obtain the data was the same as on previous years. As for a number of products, subdivisions were eliminated on the questionnaire for coating and all types combined in one. Separate questionnaires were mailed to all known fillers, valve and container manufacturers. The latter only reported total figures. Replies were returned to the office of an independent certified public accountant who collected and tabulated all the data. Only the final total in each product classification was reported to the CSMA. After the tabulation was completed the original questionnaires were destroyed by the accountant.

This year, for the 1959 data, the questionnaires were sent to 217 companies having aerosol filling lines. Because of the efforts of the committee and the cooperation of the fillers a higher percentage answered than in any previous year. Of the 217 companies solicited 19 reported no production in 1959 and 115 responded with their detailed breakdown of aerosol products. In comparison in 1958 only 95 companies replied out of 211.

Included in the overall survey were the production figures for Canada. However a separate tabulation of the production of eight Canadian companies reporting showed a total glass and metal container output of 20,176,245 units.

Aerosol paint manufacturers have held out the goal of attaining the

Table I

Coatings and (or) Finishes All Types (Pigmented, Metallic, Clear Plastic, Protective and Decorative, etc.)	16 Ounces	12 Ounces	6 Ounces and less	TOTAL
	36,570,326	9,636,131	6,349,379	52,555,836

number one spot in volume among the various product catagories. The 1959 survey indicates that this objective is still very much in the future.

A comparison of the leading classes (adjusted figures) follow:

Hair Sprays	99,687,474
Insect Sprays	80,910,774
Shaving Lather	76,610,959
Room Deodorants	69,723,589
Coatings	56,555,836
Colognes & Perfumes	39,077,461

Of significant interest to the paint industry is the more rapid growth of household aerosol products in general.

Excluding room deodorants but including glass cleaners, shoe, show and leather dressings, waxes and polishes, metal, oven, rug and upholstery cleaners, water repellents, etc., the reported figures for 1959 were nearly 78 million compared with about 26 million in 1958. The largest gainer in this group was glass cleaner increasing in one year from about 3½ million to 18½ million. For the first time, household and automotive waxes and polishes, nearly 12 million units, were reported separately. This figure is considered low however, due to incomplete reporting.

On the basis of the above tabulations the CSMA estimates that the total retail value of non-food aerosol production in 1959 will be about ¾ of a billion dollars.

As in previous years the advisability of conducting a separate survey of food aerosol was considered but rejected since it was felt that a meaningful report would not result. Private estimate of food aerosols in 1959 would probably result in a concensus of about 100 containers, mostly whipped toppings.

The aerosol industry has predicted a total production of one billion containers, food and non-food in 1963. With the 1959 survey now available this goal should be achieved readily.

Aerosol Developments

New Snap-On Spray Can Handle Converts Spray Cans To Professional-Type Spray Guns

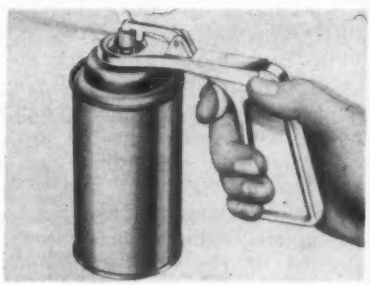
SOMETIMES in the history of a fast growing industry, a leveling off in demand occurs, often seemingly unrelated to other economic conditions. On close examination it is usually found that some of the less desirable features of the product or package are becoming known to the customer. He may even have temporarily returned to an original product or stopped using the new package altogether, pending specific improvements.

The aerosol industry's growth has been little short of phenomenal, and there seems to be small chance of a leveling off in the near future. However, customer complaints and dissatisfaction have been with the industry since its very inception. Some of these complaints have been important enough to keep the customer from purchasing an aerosol a second time. In other words, it seems that the present push-button device alone does not *always* provide the ultimate in acceptance that will assure continued purchases. Some of these points may be listed as follows:

(1) Lack of positive directional control, necessitating the exercise of extreme care by the user. Some customers, either through carelessness or lack of intelligence, just do not follow instructions. It is possible for the uninformed to subject themselves to a great deal of harm by causing the product to be inadvertently sprayed in the wrong direction, due to their failure to line up the valve properly. The result is, to say the least, frustrating and can be very serious, especially with paints and similar materials. This lack of positive directional control also works against efficient application of such industrial-type aerosols as lubricants, oils and silicone sprays utilized in plastic molding, etc.

(2) This first shortcoming is also sometimes additionally aggravated by the inconsistent finger pressure on the push-button during application, with the result that a varying volume of material is sprayed.

(3) The present aerosol push-button package does not provide a *positive* means of insuring that the hands of the user will not come in contact with the spray material. An article published on page 16 of the January 1959 issue of *Aerosol Age* discloses that women purchase the bulk of aerosol sprays and that the five leaders falling in the category of this article are—insecticides, hair sprays, deodorants, paints and lacquers, and window cleaners. Women characteristically dislike having their hands come in contact with many of these materials and



Alfco Spray Handle

New handle keeps hands clean and away from possible contact with paint and provides accurate, even spraying.

would be more satisfied customers (and generally happier in the use of aerosols) if the possibility of hand contamination was eliminated.

(4) Many of the present-day aerosol sprays are used continuously and the constant finger pressure on the push-button results in hand fatigue. This is also a contributing factor in the user not being able to maintain a consistent and even pressure.

Although the aerosol industry does recognize these short-comings, it has been relatively slow to consider other aids that could eliminate these complaints.

AN interesting example of the foregoing is demonstrated by national paint manufacturers who were initially skeptical with regard to the use of a paint roller in the application of bulk paint in the home. However, in spite of this initial prejudice, in an uphill battle the paint roller has revolutionized old concepts of paint application. It is now possible for "do-it-yourself" home owners, who are rank amateurs in the use of a paint brush, to re-decorate their homes in a professional manner and with professional results at a low cost. The increased sales realized by the paint manufacturers through the home and professional use of the paint roller have been fantastic, with the result that the paint roller is now readily accepted by paint manufacturers and is distributed by paint dealers throughout the country.

A similar device, representing an improvement in the basic idea of push-button pressurized containers, is the spray can handle. Alfco's version is a snap-on device that converts aerosol spray cans to professional-type spray guns and eliminates most of the disadvantages previously mentioned. A professional research study was done on the consumer reaction to this spray can handle and the results indicated favorable reaction to this type of device. Following are results of the consumer survey taken in California and Texas:

(a) TEST: Spray Paints
97.94% of all testers reported positive reaction for use of handle.
2.06% of all testers reported negative reaction.

RESULTS: The results provide sound basis for the recomendation that any paint manufacturer package this handle with spray paint. Key advantages cited during these tests were: "Easier. . .faster. . . cleaner." As a result of the survey findings, we believe that this handle will create more feminine interest in spray painting, mainly because it eliminates much of the work effort and produces more satisfactory results, the company reported.

It is felt that this market research report indicates highly favorable consumer acceptance for spray can handles. They eliminate most of the problems in connection with application of aerosols and, specifically, offer the following advantages:

a. Instantly snap on and attach to all aerosol cans, converting spray can to professional spray gun.

b. Provide positive directional control to spray better, faster, easier, and cleaner.

c. Consistent finger pressure provides more accurate, even spraying.

d. Keep the hands clean and away from possible contact with the ingredients of the can.

e. Eliminate operator hand fatigue, thus maintaining constant and consistent pressure on the actuator.

f. Provide labor saving and increased efficiency for industrial applications.

IMPROVE:

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Tinted PVAc wall paints modified with Carbium show improved color and sheen uniformity on overlap and touch-up. Tests with several different types of PVAc copolymer emulsions show definite improvement in color uniformity plus increased hiding and higher pigment volumes with satisfactory enamel holdout. For details write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Improved Tint Base With Carbium

	Lbs.	Gals.
Rutile Titanium Dioxide[1]	218.5	6.24
Carbium	288.5	13.15
Diatomaceous Silica[2]	43.7	2.27
2% Methocel Solution (4000 cps)	100.0	12.00
Polyglycol P-1200	2.0	.25
Emulphor EL-719	3.0	.34
Tamol 731	8.7	1.02
Sodium Benzoate	1.0	—
Ethylene Glycol	25.9	2.81
Water	225.6	27.17
Grind on Morehouse Mill and add:		
PVAc Copolymer Resin Emulsion (50% solids)	315.0	34.75
Phenyl Mercuric Acetate	1.0	—
Total	1232.9	100.00

Test Results

Initial Viscosity	83 KU	Enamel Holdout Test	58°
PVC	57.6%	Reflectance	90.0
Angular Sheen	Low	Contrast Ratio	.962

[1] *TiPure R610, duPont, or equivalent.* [2] *Celite 281, Johns-Manville, or equivalent.*

Diamond Chemicals®

Aerosol Technology Discussed At Packaging Seminar

More than 75 people were in attendance at the special seminar for professional members of the Packaging Institute. The subject was "Aerosol Technology." Held on June 1, at the Statler Hilton Hotel in New York, the seminar dealt with problems relating to aerosol containers, components and machinery.

Moderating the panel of 18 was Fred T. Pickerell, Senior Buyer of The Schering Corp. The panel was composed of the following:

Jean W. Baer, Sprapak Chemicals, Inc.;

Charles E. Beach, Stalfort Pressure-Pak, Inc.;

John Beacher, Avon Products, Inc.;

Walter C. Beard, Risdon Mfg. Co.;

L. G. Cannella, Continental Can Co.;

Victor DiGiacomo, Givaudan-Delawanna, Inc.;

J. J. Gregory, Newman-Green, Inc.;

A. R. Marks, Wheaton Plasti-Cote Co.;

Russell McGhie, Colgate Palmolive Co.;

Dr. Francis A. Mina, Reed Carnick Co.;

Ralph Minervino, Metal Fabricating, Inc.;

John J. Palmer, Peerless Tube Co.;

H. E. Peterson, Peterson Filling & Packaging Co.;

Joseph C. Pizzurra, Precision Valve Co.;

W. M. Robertson, Owens-Illinois Glass Co.;

H. R. Shepherd, Aerosol Techniques, Inc.;

Bradford K. Smith, The Nestle Co.; and

Sigmund Was, Emson Research, Inc.

Among the subjects discussed were steel and aluminum valve ferrules, corrosion, can costs, pressure and cold filling, and contract filling.

Aerosol Production Reaches New High

Production of non-food aerosols reached a new high in 1959 of more than 575 million units, reflecting the trend of increasing consumer acceptance which aerosols have enjoyed for several years. This is a 22% increase over the 1958 figure of 470 million units for the fourteen year old industry. It represents an estimated total retail value of three-quarters of a billion dollars.

This estimated report was made today to the pressure packaging industry at the 46th Mid-Year meeting of the Chemical Specialties Manufacturers Association. It is based on information obtained from aerosol fillers, container and valve manufacturers.

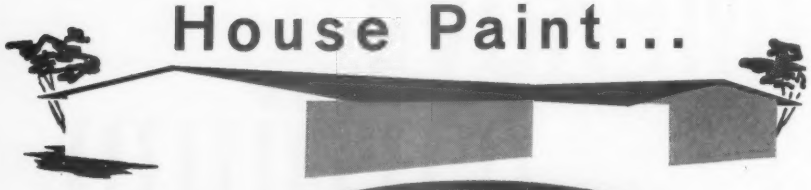
The 1959 ninth annual survey conducted by CSMA shows that the 6 oz. or smaller containers still lead in sales popularity. It also revealed that the large economy size 16 oz. package continued to increase in popularity with consumers and now accounts for more than a quarter of total production. They are particularly popular for such products as spray paints, insecticides, hair sprays and glass cleaners.

For the first time the survey included a separate report of Canadian Aerosol production which is about 3 per cent of the American total.

Rapid Pressure Method

The Aerosol Scientific Committee of the Chemical Specialties Manufacturers Association has completed preliminary work on development of a new rapid method for determination of pressure in aerosol containers.

For Outside House Paint...



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Green Label No. 45	Med.—Low	Medium
Green Label No. 40	Medium	Medium

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(*From page 43*)

also, the enamels are comparable with amino alkyd types. Sward hardness values averaging 32 are typical dependent upon pigmentation.

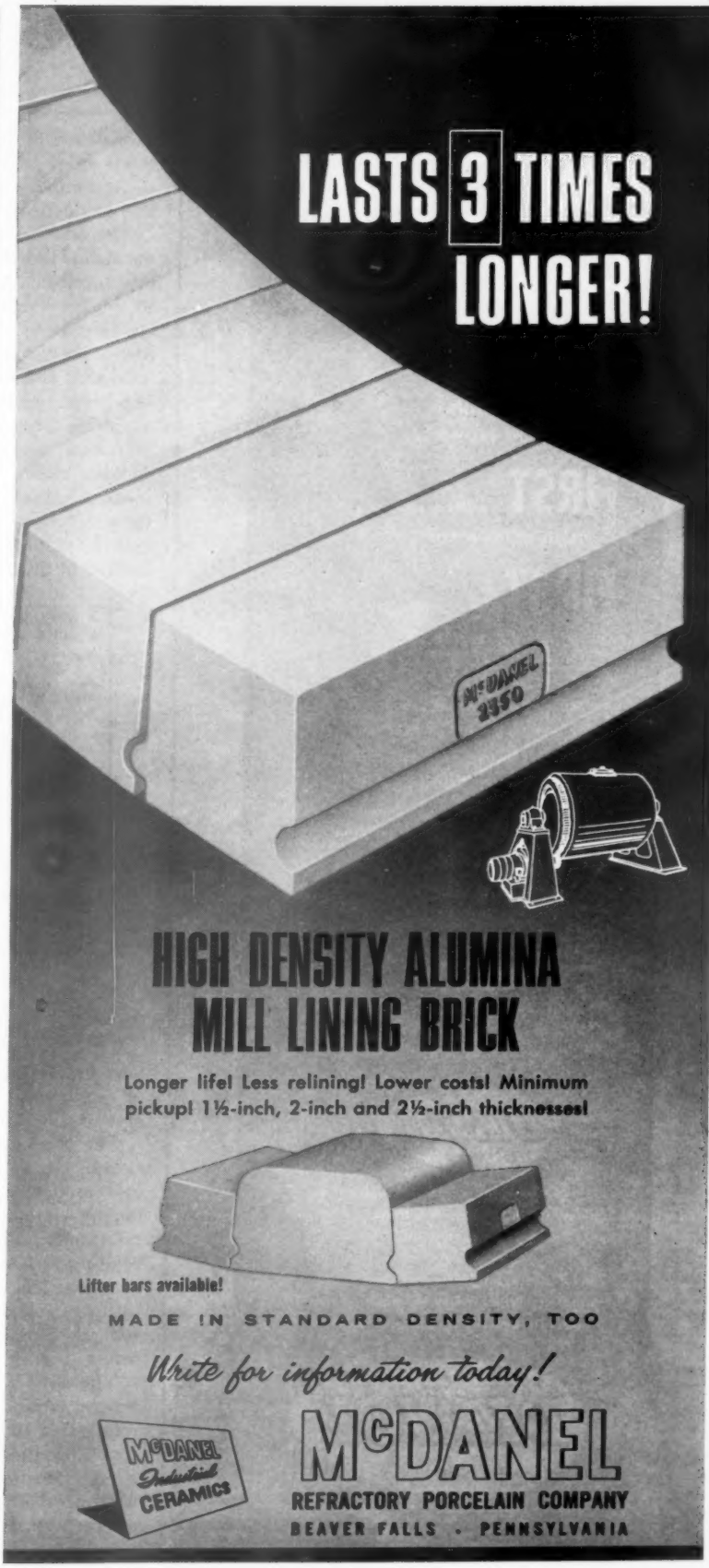
Bend tests over a conical mandrel show adequate flexibility with no failure at one eighth inch diameter. Front impact ratings on enamels baked on unprimed steel average eight inch pounds. Adhesion is good as determined by knife testing.

Salt spray resistance is good. Tests conducted on primed panels using 5% sodium chloride in demineralized water at 95°F. showed after 400 hours neither rusting nor blistering. Creepage from the scratch was 1/16 inch. After 800 hours no change was evident other than an increase in the creepage to 1/8-inch.

Water resistance is excellent. When applied over a suitable primer, no failure has occurred at 2000 hours immersion.

Durability of "Melaqua" 600 enamels appears to be similar to that of the best commercial melamine-alkyd automotive enamels. After two years in Florida phthalcyanine blue enamels show satisfactory metal protection and good polished gloss. A broad series of other pigmented finishes after exposure for shorter periods of time indicate similar long term durability. In white enamels the choice of the proper grade of titanium dioxide is important. Semi-chalking titanium dioxide at a pigment to binder ratio of 80-100 appears to give the best results and exposure date tests to date are on a par with a white melamine-alkyd finish.

From the foregoing data it is apparent that the new melamine cross-linked acrylic resin system will have a broad range of utility in industrial and decorative finishing. Eliminating the hazards of industrial finishing without sacrifice in protective and decorative characteristics, "Melaqua" 600 represents a major forward step in paint technology.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(*From page 30*)

12.8 and 11.3. The data indicate that the use of reflux tends to result in a higher acid value for varnishes cooked under total reflux. The effect of cooking time was inconclusive.

The effect of cooking time on the viscosity of the varnish is shown by Figure 2. The data show that, as cooking time increased, the viscosity of the varnishes by both types of cooking increased as a function of cooking time. However, the viscosity of the varnishes prepared in the closed vessel under total reflux increased at a relatively slow rate, with no trace of gelling even when cooking was for 7.5 hours. The varnishes prepared in the open vessel without reflux increased very rapidly in viscosity with increasing cooking time. The final point of this curve represents the absolute maximum length of time, 4.4 hours, for which this varnish can be cooked in an open vessel without gelling severely and some gel had actually formed in this cook. When the next cook of this open

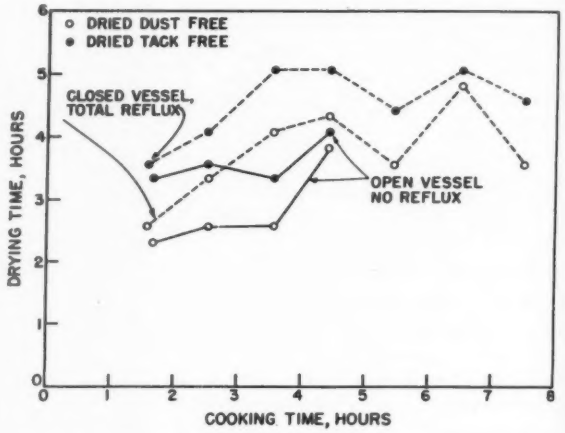

Figure 3. The effect of cooking time and reflux on the drying rate of the varnishes.

vessel series, which was scheduled for a cooking time of 5.5 hours, was attempted it gelled solidly after being cooked for 4.5 hours.

The effect of length of cooking time on the drying rate of the varnishes is given by Figure 3. The general tendency with both types of cooking was for drying time to increase with cooking time but this relationship did not hold for the longer period cooks, tending to level off, decrease, increase, and again decrease as length of cooking time increased. The varnishes cooked in the open vessel without reflux tended to dry more rapidly than those cooked under reflux.

The data from the laboratory cooks show that with proper equipment and control of cooking time and reflux this 100% tung oil varnish can be prepared so as to produce a product having essentially any desired viscosity within the range of 1.8 to 100 stokes with no risk of gelling. The data also show that an appreciable degree of control of the drying rate of the varnish can be exercised.

Summary

Data derived from pilot plant and laboratory scale experimental work are presented which demonstrate that a tung oil varnish vehicle formulation consisting 66.7% of tung oil, 13.3% of zinc resinate, and 20% of a maleic modified rosin ester can be cooked successfully in closed, liquid heated vessels of commercial size without danger of gelation. It was, however, found that with this formulation reflux of the volatiles given off by the cooking varnish was essential to the prevention of gelling if the total cooking time employed exceeded about 4.5 hours. Data are also presented which show that by varying the length of cooking time and the conditions of reflux under which cooking is done, varnishes varying in viscosity from 1.8 stokes to 300 stokes (at 50% solids content) can be produced. It is also shown that the drying time of the varnishes produced can be controlled to some extent by controlling the time of cooking and by the use or nonuse of volatiles reflux.

Acknowledgment

The authors wish to express their appreciation for the technical advice and counseling of L. L. Hopper, Jr., and F. G. Dollear. They also wish to thank N. L. Marquette for conducting many of the laboratory preparations and tests, and S. M. Stark for determination of viscosities.

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TUNG OIL—COST

(*From page 36*)

firing, especially at the 337,500 gallon production level as is shown in Table 1.

Summary

Costs for producing 50 percent solids tung oil-resin varnish vehicle of 15-gallon and 25-gallon oil lengths have been estimated to range from $1.27 per gallon at an annual production of 680,000 gallons, to $1.50 per gallon at an annual production of 10,000 gallons. It has been found that a combination of annual production requirements, total plant cost, and equipment preferences of the manufacturer would be the main considerations in selecting the size, type, and number of kettles; and that kettle type and size have little apparent effect on costs.

Additional costs for thinning the 50 percent solids mixture with an equal volume of V.M. & P. Naphtha for use as a floor sealer were estimated to be 12.6 to 26.7 cents per half-gallon of 50 percent solids mixture, resulting in costs of $0.76 to $1.02 per gallon of 25 percent solids mixture.

Acknowledgment

The authors wish to express their appreciation for the technical advice and counseling of L. L. Hopper, Jr., and F. G. Dollear. They also wish to thank G. I. Pittman for assistance in preparing the drawings and Claire L. Weber for preparing the tables.

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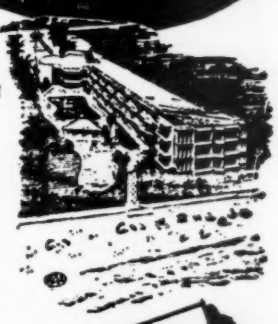

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NEWS

NEWS OF COMPANIES, ASSOCIATIONS
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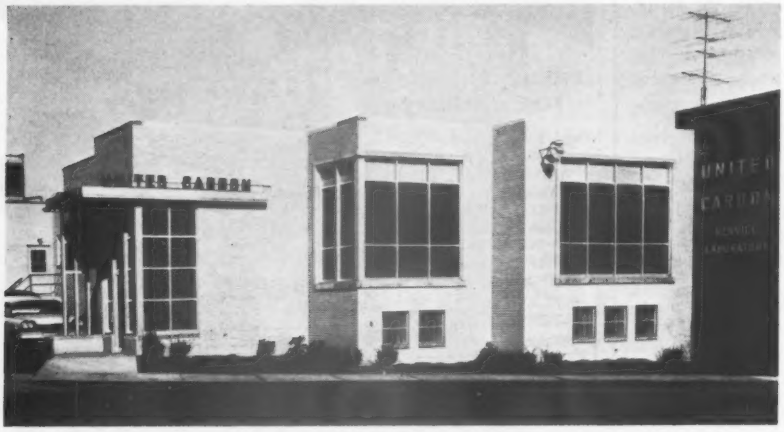

United Carbon opened a new $750,000 Service Laboratory Company in Akron, Ohio. The modern two story building houses a complete range of mixing and commercial processing equipment as well as the latest physical and analytical testing units.

Practical interpretation of processing and testing data both for customer use and for product improvement programs is the major goal of this new service facility.

Gordon Research Conference Features Coatings Session

The Gordon Research Conferences for 1960 will be held from June 13 to September 2 at Colby Junior College, New London, N.H.; New Hampton School, New Hampton, N.H.; and Kimball Union Academy, Meriden, N.H.

The conferences were established to stimulate research in universities, research foundations, and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and discussion groups. Sufficient time is available to stimulate informal discussions among the members of each conference. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading, or participation in discussion groups, as the individual desires. This type of meeting is a valuable means of disseminating information and ideas to an extent that could not be achieved through the usual channels of publication and presentation at scientific meetings. In addition, scientists in related fields become acquainted, and valuable associations are formed that often result in collaboration and cooperative efforts between different laboratories.

Under the chairmanship of S. Gusman, sessions on Organic Coatings are planned:

8 Aug. C. A. Kumins, "Diffusion of gases and vapors through pigmented and unpigmented vinyl-films — glass transition effects"; E. G. Bobalek, "Inferences regarding polymer structure and properties from solubility studies."

9 Aug. J. Gaynor, "Fluidized bed coating"; Claus Victorius, "Organosol finishes from acrylic two-stage emulsion copolymers."

10 Aug. Raymond R. Myers, "The rheology of film curing"; J. C. Petropolous, "Thermosetting acrylic coating resins."

11 Aug. John W. Swanson, "Some research problems in the coating of paper"; A. E. Rheineck, "The chemistry and technology of polyvinyl drying oil fatty acid esters."

12 Aug. W. H. Slabaugh, "Adsorption and pore volumes of unsupported organic films as related to filiform corrosion processes."

General Electric to Build First Polycarbonate Plant

Construction work is proceeding rapidly on the first self-contained polycarbonate resin manufacturing plant in the United States, being built alongside the Ohio River near Mount Vernon, Indiana, by the Chemical Materials Department of General Electric Co. The new facility is expected to be in operation in the third quarter of this year.

This multimillion-dollar, multimillion-pound-per-year, commercial plant represents a further scale-up of semiworks and pilot plant facilities that have operated since early 1957 at Pittsfield, Mass., and from which more than 200 production applications for General Electric's Lexan® polycarbonate resin are being supplied.

The Indiana installation will meet the growing demand for polycarbonates, while the Massachusetts unit will be devoted to further development work in this new field of premium-property plastics.

Harry D. Armitage Retires

Harry D. Armitage, manager of the New York Office of Emery Industries, Inc., retired last mont after 35 years of sales in the New York area.

Climaxing his outstanding career, he was present with the Distinguished Salesman's Award of the Cincinnati Sales Executives Council at its award dinner on May 11. He was the guest at a banquet held in his honor by his fellow workers in Cincinnati, at which he was presented with a silver cigarette dish.

Although Mr. Armitage originally joined Emery on May 1, 1925, as a member of the purchasing department, he shortly thereafter transferred to the sales department. In September he moved to the company's New York office, which he has made his headquarters ever since.

Tamms Appoints More Thompson-Hayward Offices

Thompson-Hayward Chemical company in Minneapolis, Kansas City, and Memphis has been appointed as Tamms Industries Co. representatives. The appointment was made in order to strengthen representation in these markets for Tamms Silicas: Soft Amorphous, Crystalline, and Diatomaceous.

NEWS

Petro-Tex Has New Process—Will Build Houston Plant

Petro-Tex Chemical Corp. of Houston, Tex., has developed a new process to produce maleic anhydride from low-cost C4 hydrocarbons as a starting raw material, it was announced by Sydney T. Ellis, president.

The process is a development of Petro-Tex Research and represents an important technological breakthrough, Mr. Ellis said. The new process has been thoroughly proved in pilot plant operation. Engineering is substantially complete and a contract has been let for a 30 million pound per year plant. The multi-million dollar plant will be built within the Petro-Tex plant complex at Houston, using its feedstock streams, utilities, and services. Completion of the plant is scheduled for mid-1961.

The specific advantage of the Petro-Tex process, according to Dr. L. Marshall Welch, Vice President Research and Development, is in the straightforward oxidation of four-carbon feedstock to produce the four-carbon maleic anhydride. This improves on the conventional process based on six-carbon benzene which inherently loses one-third of the feedstock. "The Petro-Tex process has already achieved yields higher than those obtained from benzene, and with a one-third higher theorectical maximum, there is considerable room for even further improvement in yields and costs," Dr. Welch said.

Engineering is being done by Scientific Design Co., Inc. of New York. Scientific Design is fully experienced in the design, development and construction of maleic anhydride plants, having installed a number of plants in this country and abroad.

The new plant is designed for maximum automation and will require a minimum number of new personnel. Petro-Tex presently employs approximately 700 people at the Houston location.

Harry G. Walter (left), executive director of the Michigan State University School of Packaging Foundation accepts a contribution check for $10,000.00 from Kenneth B. Hollidge, (right) president of the Packaging Machinery Manufacturers Institute. The money will be used to purchase research and development equipment for a new Michigan State University School of Packaging.

Hercules Distributes Grants To College and Universities

Over $110,000 in unrestricted grants-in-aid is being distributed by Hercules Powder Co. among thirty colleges and universities. The unrestricted grants-in-aid program gives complete freedom in the use of these funds to the heads of departments of chemistry, chemical engineering, physics, mechanical engineering, and others in the participating schools.

Based on the theory that the educators themselves know what is best to strengthen the American educational system, Hercules' long-standing program of financial aid to institutions of higher education is designed to provide them with the freedom so necessary to achieve new levels in their fields of science.

Workman is charging ingredients into one of the stainless steel reactors at the new acrylic plant of Catalin Corp. of America. The modern, 10 million pound-per-year facility at Fords, N. J. has just gone onstream and is producing a variety of acrylic emulsions and solutions for use by manufacturers of paints and coatings, textiles, paper, leather goods, adhesives and other products.

NEWS

Witco Plans New East-Coast 30-Million-Pound Phthalic Anhydride Plant

Plans for the construction of a 30-million-pound phthalic anhydride plant at an east-coast site were announced by Max A. Minnig, president of Witco Chemical Co.

The expansion will enable the firm to broaden its service to customers in the East, and to participate in the growing phthalic anhydride requirements of the polyester, plasticizer and paint fields.

The new installation, which will utilize a naphthalene-oxidation process, is scheduled for completion by the last quarter of 1961.

On completion of the project, Witco will have two completely integrated phthalic anhydride producing locations. The other plant —a 20-million-pound unit at Chicago—went on-stream last year.

Signal Changes Eastern States Name

Signal Oil and Gas Co. has changed the name of its Eastern States Petroleum and Chemical Company division to Houston division, it was announced.

Signal's Houston division was formerly Eastern States Petroleum & Chemical Corporation, which merged with Signal in September, 1959.

R. N. Blaize, who was president of the former Eastern States firm, will continue to head the Houston division as a vice president and director of Signal.

Houston operations include a refinery with a capacity of 60,000 barrels a day, petrochemical manufacturing and research, and a chain of service stations marketing under the Starfire brand.

Petrochemicals manufactured by the company's Houston division will continue to be marketed under the Espesol brand.

Espesol products include benezene, toluene, xylene, and heptane, as well as a wide variety of aromatics and aliphatic solvents.

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Cleveland Paint Society Offers Scholarship Award

The Cleveland Society for Paint Technology, wishing to encourage and stimulate the study of subjects in its field, offers an award of $200 to a qualified student for a new thesis judged the best submitted after the end of the next school year and until December 31, 1961. A like amount will be presented to the student's major faculty adviser, or divided equally if there is named more than one adviser. Joining in this offer is the Cleveland Paint, Varnish and Lacquer Assn.

A qualified student is one, a candidate for a degree, in an accredited institution of higher learning in the area of the Society, roughly from Sandusky to Erie, Pa., and south from Lake Erie to include Mansfield, Wooster, Massillon, Canton, Alliance, Youngstown, and Oil City, Pa.

The subjects suitable for research in this field cannot be defined in detail, and it is possible that some can be recognized as important only after completion of the work. The list following will illustrate in some degree the wide scope of the possibilities for investigation.

Developments in the theory or practice of organic chemistry which may lead to new polymers, polymer intermediates, or polymerization processes.

Contributions to the theory of solubility, particularly for polymer solutions.

Surface chemistry, or rheology, or structure of particulate dispersions.

Colloid chemistry of gels or gelation processes.

Fundamental advances in the theory of flow, or application of rheology to engineering problems.

New experimental techniques for the study of the engineering problems of dispersion, mixing, or heat transfer in viscous materials.

Analytical methods having an important significance to research or product and process control in the paint industry.

Developments in solid-state theory, particularly such as will help us to understand phe-

August 8-12. Gordon Research Conferences, Organic Coatings, Colby Junior College, New London, N. H.

September 8-10. Symposium on Physical Processes of Drying and Aging of Paint films, Cleveland Society for Paint Technology, Case Institute of Technology, Cleveland, Ohio.

PRODUCTION CLUBS

Baltimore, 2nd Friday, Park Plaza Hotel.
Chicago, 1st Monday, Furniture Mart.
C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Hayes Hotel
Cleveland, 3rd Friday, Cleveland Engineering & Scientific Center.
Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.
Detroit, 4th Tuesday, Rackham Building.
Golden Gate, 3rd Monday, Sabella's Restaurant, San Francisco.
Houston, Monday prior 2nd Tuesday, Rams Club.
Kansas City, 2nd Thursday, Pickwick Hotel.
Los Angeles, 2nd Wednesday, Scully's Cafe.
Louisville, 3rd Wednesday, Seelbach Hotel.
Montreal, 1st Wednesday, Queen's Hotel.
New England, 3rd Thursday, University Club, Boston.
New York, 1st Thursday, Brass Rail, 100 Park Ave.
North Carolina, 3rd Wednesday, Rainbow Supper Club, High Point.
Northwestern, 1st Friday, St. Paul Town and Country Club.
Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.
Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.
Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.
Rocky Mountain, 2nd Monday, Republican Club, Denver, Colo.
St. Louis, 3rd Tuesday, Kings-Way Hotel.
Southern, Annual Meetings Only.
Toronto, 3rd Monday, Oak Room, Union Station.
Western New York, 1st Monday, 40-8 Club, Buffalo.

NEWS

nomena like adhesion, reinforcement of polymers or stability to thermal or photon radiation. Mechanism of stabilization of colloidal dispersions.
Statistical techniques applicable to the design of experiments or evolutionary operation for processes important to the paint industry.
Design of equipment or processes applicable to the paint industry.
Physics or psychology underlying color perception or color selection.

Entries are to be sent to Mr. Harold L. Jaffe, 6620 Union Ave., Cleveland 5, Ohio. For entry blanks or for further information with respect to the contest, please write Mr. Jaffe, who is chairman of the Technical Education Committee of the Cleveland Society for Paint Technology.

E. C. B. Kirsopp Dies

Edgar Craig Buchanan Kirsopp, a director of Rohm & Haas Co., Philadelphia, died in a Carmel, California, hospital on May 27 after a brief illness. He was 67.

Mr. Kirsopp was born in Scotland and received his college education at the University of Edinburgh. He came to America and joined Rohm & Haas in 1919. He served as vice president of the company for many years and was president of the associate firm, The Resinous Products & Chemical Co., when that organization was merged with Rohm & Haas in 1948. Following the merger he held the post of vice chairman of the board of the parent firm until 1953.

Following his retirement at the end of 1957, Mr. Kirsopp moved to California and had made his home at Pebble Beach, near Monterey, for the past 2 years. He had maintained his interest in the corporate affairs of the company with which he had been associated for so many years, however, and had attended the regular quarterly meeting of the Board of Directors only a few weeks ago.

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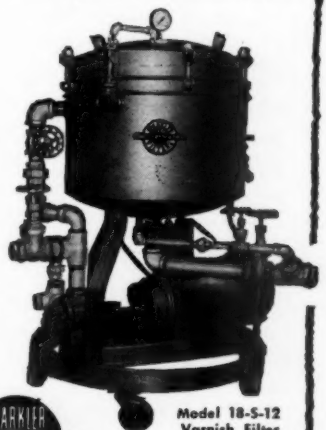

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PERSONNEL CHANGES

HEYDEN NEWPORT

Robert J. Keltz has been appointed district manager of the Chemical Division's Philadelphia-Wynnewood sales office, it was announced. This office serves the Middle Atlantic states.

Mr. Keltz has been engaged in technical service and sales activities in the chemicals processing industries for the past ten years. He joined the firm's Chemical Division in 1956 as a sales representative operating from the Newark sales office.

Robert M. Aude has been appointed president of the Chemical Division.

Since 1958, Mr. Aude has been vice president and general manager of the division.

PATTERSON-SARGENT

Dr. Charles A. Coffey has been appointed to fill a newly-created post of technical director. Dr. Coffey will fill a long-time need for co-ordinating technical development with various phases of paint manufacture.

PITTSBURGH PLATE

Roger D. Freriks has been appointed manager of color division in Detroit.

He succeeds **John F. Green** who has been named general manager of the paint and brush division's pacific coast operations with headquarters at Torrance, Calif.

R. D. Freriks

H. S. Cockeram

ACME SHELLAC

Herbert S. Cockeram has been named Research Director. Mr. Cockeram received his B.S. Degree in Chemistry from the Polytechnic Institute in Brooklyn and has taken post-graduate studies in polymers and surface coatings at Polytechnic Institute and at Rutgers University.

NATIONAL CAN

John W. Haslett has joined the company as manager of production planning for the central division. He will headquarter at the Chicago general offices.

UNION CARBIDE

New assignments for **James B. Mumma, John A. Hardy, Clair S. Mitch, John R. West, D. Wallace Enright, James R. Leusch,** and **Coleman C. Yeaw** have been announced.

Mr. Mumma is now office manager in the Boston district. He was formerly a technical representative assigned to the Newark district.

Mr. Hardy, previously a supervisor in the General Sales Office, has been assigned as an assistant to the Product Management Group.

Mr. Mitch, formerly a technical representative in the Chicago district, is now a supervisor in the General Sales Office.

Mr. West has been transferred to the Newark district. He was previously a technical representative in the Cincinnati district.

Mr. Enright, previously a technical representative in the Chicago district office, has been transferred to field sales.

Mr. Leusch, formerly assigned as a technical representative in the Boston district office, has been transferred to field sales in the Houston district.

Mr. Yeaw, previously assigned as a technical representative in the Newark district office, has been transferred to Cincinnati district field sales.

WYANDOTTE CHEMICALS

The following appointments of four new research staff members to its contract research department have been announced:

Saiyid M. Naqvi received his B.S. degree from the University of Sind in Karachi, Pakistan and his Ph.D. degree from the Illinois Institute of Technology.

Bernard A. Merkl received his master's degree in organic chemistry from the University of Detroit and comes to the firm with additional graduate and industrial research experience.

Donald E. Witt received his bachelor's and master's degrees in chemistry from Wayne State University and comes to the firm with previous industrial research and development experience.

George Roley received a B.S. degree from the Michigan College of Mining and Technology and an M.S. degree in chemical engineering from Iowa State College. Prior to joining the firm he was employed at the Ames Laboratories of the Atomic Energy Commission located at the Iowa State campus.

CARGILL

Manuel V. Carneri has been named to the technical services research staff. Mr. Carneri will work in the development of new vehicles and formulations for paints, varnishes and other coatings.

AIR REDUCTION CHEMICAL

Patrick R. Beck and **Donald A. Smith** have been assigned to the Chicago office as sales and development representatives.

Patrick R. Beck, who will cover Indiana, Michigan, and Ohio, was with Spaulding Fibre Company as a sales engineer. He joined the firm in 1959 and was assigned to the company's Technical Sales Laboratory at Bound Brook, N. J.

Donald A. Smith, whose sales territory includes Illinois, Wisconsin, Minnesota, Iowa, and Kansas, was previously in the company's Technical Sales Laboratory at Bound Brook, N. J. Formerly product manager for the Victor Chemical Works, Chicago, he was also a member of the sales staffs of Commercial Solvents Corporation and the Carter Products Company.

EMERY INDUSTRIES

Robert J. Roberts, has been named district manager of the fatty acid sales department.

Mr. Roberts will provide field direction for sale of the department's products in the area covered by the New York and Boston offices. This includes New England, Eastern New York State, and New Jersey.

R. J. Roberts

W. G. West

STANLEY CHEMICAL

William G. West has been appointed sales manager. Mr. West comes to the company from The Borden Chemical Co., New York City, where he had been general sales manager since 1956. Previously he was director of sales, plastics division of the Celanese Corp. of America, Newark, N. J.

REICHHOLD CHEMICALS

In a move designed to keep pace with its rapid growth, the firm announced the appointment of five new vice presidents for the following areas: **Joseph E. D'Angelo,** Vice President-Manufacturing, Elizabeth, N. J. plant; **William O. Fetterly,** Vice President-Manufacturing, Tuscaloosa, Ala. Division; **Edward F. Kelly,** Vice President-Manufacturing, Chemical Color Div., Brooklyn, N. Y.; **Rudolph H. Melinat,** Vice President, Pacific Southern Division, Azusa, Calif.; and **Thomas P. Shumaker,** Vice-President-Sales, Tuscaloosa, Ala. Div.

NATIONAL STARCH

Frank J. Brundage has been named New England division manager. Mr. Brundage is assuming responsibility for all product lines of the company.

F. J. Brundage

Joseph Epstein

PATTERSON FOUNDRY

Joseph Epstein has been appointed vice president in charge of manufacturing and engineering.

Mr. Epstein was vice president of Perry Products Co., producer of stainless steel tanks, and had also been the company's plant superintendent, chief engineer and sales consultant.

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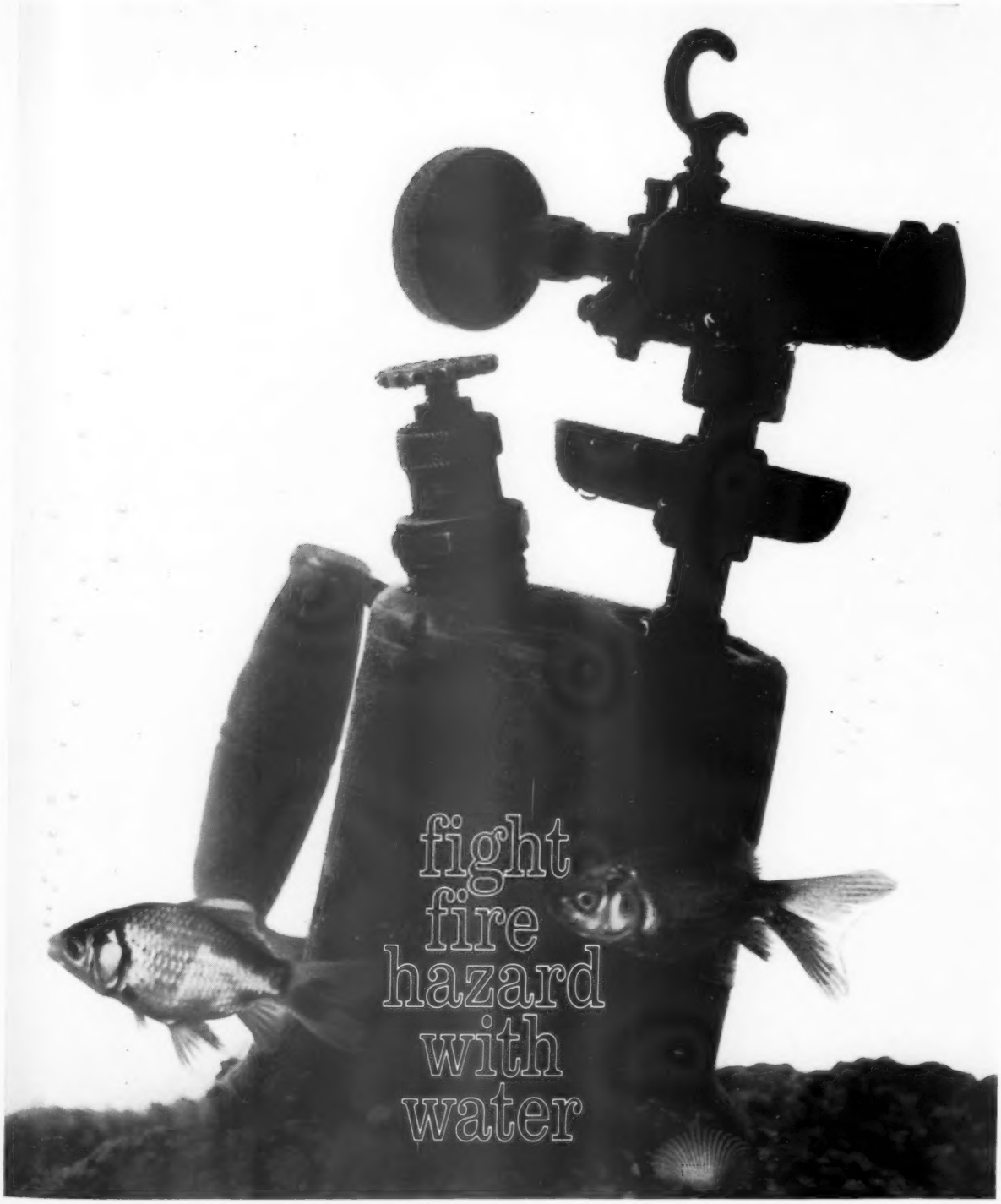

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